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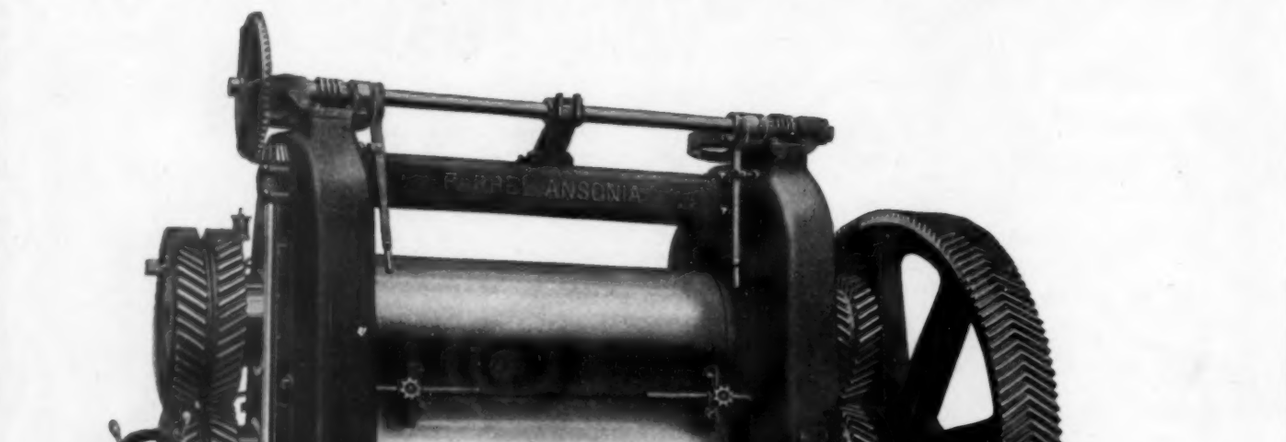

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THE RUBBER AGE AND TIRE NEWS

Determination of Permeability of Balloon Fabrics

By Junius David Edwards*

One of the most essential characteristics of a balloon envelope is that it shall be gas tight, or nearly so. therefore the determination of the permeability of balloon fabrics of hydrogen, which is the gas used in the modern dirigible and kite balloons, is of first importance in determining their suitability for balloon construction. In connection with a study of the permeability of balloon fabrics it has been necessary to investigate different forms of apparatus and the influence of experimental conditions in order to interpret test results intelligently. The results of the Bureau's investigation of methods of determining permeability are presented in this paper. The effect of composition, method of construction, etc., upon the permeability will not be discussed in the present paper, which deals only with testing methods.

A great many materials have been suggested for rendering fabric gas tight; the great majority of balloon envelopes, however, are made from rubber-coated silk or cotton, usually the latter. For the balloon envelope, two plies of cloth are used with the gas-tight rubber film between them. The two plies may be placed parallel to each other or one ply may be placed at an angle of 45 degrees; the biased fabric is supposed to offer greater resistance to tearing. Usually from 100 to 130 grams of rubber per square meter are placed between the plies. For protecting the fabric and the gas-retaining rubber film from the action of light, heat, moisture, etc., rubber coatings may be applied on the outside; further protection is sometimes added by coating the inside of the fabric also. Lighter single-ply fabrics are sometimes made for use in balloonets and three-ply fabrics find use in large dirigibles or supply balloons.

Goldbeater's skin finds some application in dirigible balloons of the rigid type. Oiled fabrics of various kinds, as well as fabrics coated with lacquers made from cellulose acetate or nitrate, have been tried. Various coatings have also been applied to rubberized fabrics with a view to rendering them more nearly gas tight and inereasing their durability. However, none of these has been found entirely successful.

Theory of Permeability Process

Gas escapes from a balloon envelope through leaks at valves, seams,

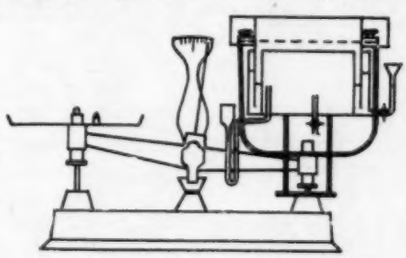

FIG. 1—RENARD-SURCOUF BALANCE

and imperfections in the fabric, and by passage through the fabric. Hydrogen might pass through the fabric by diffusion through minute holes in a manner similar to the passage of a gas through a porous plate or it might escape by solution in the rubber film with subsequent evaporation from the other side. As a matter of fact, both processes occur simultaneously. The escape of hydrogen through openings in the fabric is only a case of gas effusion, but the passage of hydrogen through the rubber of the fabric is a very different phenomenon.

Thomas Graham,[1] in 1866, investigated the flow of gases through rubber films and showed that it was a solution phenomenon and not a diffusion phenomenon. If gases passed through rubber films by diffusion through microscopic holes, their relative rates of escape should be approximately inversely proportional to the square roots of their densities. Graham showed, however, that the rates of penetration of different gases bore no relation to their density. He found the relative rates of penetration of rubber by different gases to be as follows:

Nitrogen	1.0
Methane	2.15
Oxygen	2.56
Hydrogen	5.50
Carbon dioxide	13.58

The rate of change of permeability of rubber films with change of temperature is also much greater than can be accounted for by the diffusion theory. These and other facts have shown that gases penetrate rubber by first dissolving in the rubber.

When a rubber-coated balloon fabric is placed in contact with hydrogen on one side and air on the other, the following process is substantially what occurs. Both the hydrogen and the oxygen and nitrogen of the air dissolve in the rubber film and tend to saturate it up to the limits determined by the temperature and by the partial pressure of each gas. Each gas penetrates the rubber film at its characteristic speed, and when it reaches the opposite side of the rubber film the gas evaporates from its solution in the rubber because the partial pressure of the gas in question is substantially zero. More of each gas is dissolved continuously on the first side of the fabric and a dynamic equilibrium is reached which continues so long as fresh air and fresh hydrogen are available at the two surfaces. In this manner hydrogen passes through the rubber to the air side and air passes through to the hydrogen side.

These facts will be discussed more fully in connection with the experimental work and their bearing on methods of test pointed out.

Methods of Determining Permeability

The permeability of a balloon fabric may be defined as the rate at which it is penetrated by a certain gas; except when stated otherwise,

* Associate Chemist, Bureau of Standards

Technologic Paper of the Bureau of Standards, No. 113.

[1] Phil. Mag. 32, p. 401; 1866.

this gas is understood in this paper to be hydrogen. Permeability will be expressed in terms of liters of hydrogen per square meter per 24 hours, the volume of hydrogen being corrected to the standard conditions of 0°C and 760 mm mercury pressure.

The methods in use for the determination of the permeability of balloon fabrics to hydrogen may be divided into two classes: (1) Methods which measure the rate of decrease in volume of a mass of hydrogen separated from the atmosphere by a definite area of the fabric; or (2) methods which measure by chemical or physical means the volume of hydrogen passing through a definite area of fabric in a given period.

The two methods may be characterized as the volume loss and penetration methods, respectively. According to the definition of permeability just given the volume-loss method does not measure the permeability of a fabric because in the volume-loss method the quantity measured is the volume of hydrogen escaping minus the volume of air passing into the hydrogen chamber. What it measures is the difference in the permeability of the fabric to hydrogen and air. Accordingly, any result obtained with this method will be characterized as the "volume-loss" permeability.

(*a*) *Volume-Loss Methods.*—The most widely used apparatus for applying the volume-loss method is known as the Renard-Surcouf balance. As shown in Fig. 1, it consists of the bell of a small gas holder mounted on one arm of a balance; the top of the bell is closed by the fabric (shown by a dotted line) under test. The bell moves up and down in an annular space filled with water; the annular container is attached to the base of the balance. The bell is first filled with hydrogen by alternately filling and emptying until the air has been displaced. The proper pressure is then obtained by adding weights to the opposite balance arm. As hydrogen escapes, the bell sinks, and the pointer moves over a calibrated scale indicating the volume loss. The apparatus should be kept in a constant temperature chamber.

Five other forms of apparatus of this class are described by Austerweil.[2] In each of these forms of apparatus a gas chamber filled with hydrogen is closed by the fabric under test. A graduated measuring tube is connected with this chamber and the volume of hydrogen escaping is measured by the volume of water necessary to replace it and maintain constant pressure. A leveling bottle may be used to introduce water into the measuring tube or it may be connected with a Mariotte flask which automatically introduces the water under constant pressure. If a leveling bottle is used, the pressure does not remain constant and must be adjusted at frequent intervals. The operating characteristics of this class of apparatus are discussed in section 6.

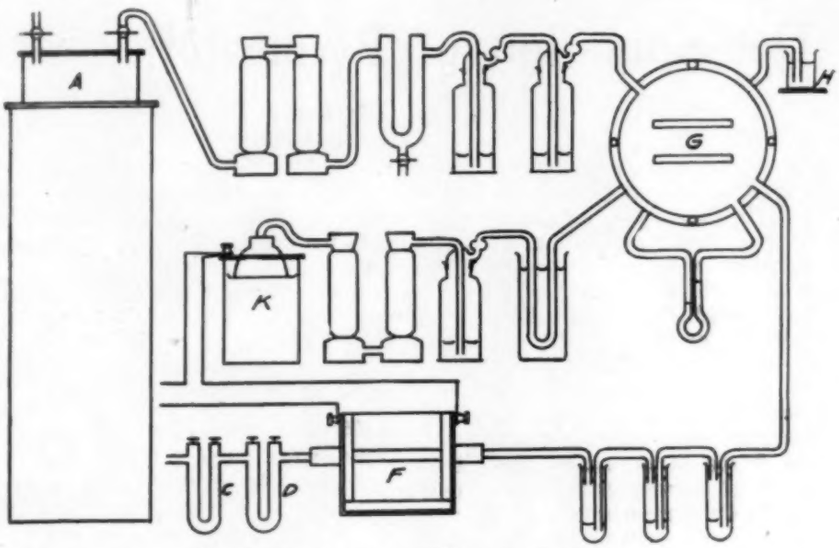

FIG. 2—APPARATUS OF BARR AND ROSENHAIN

(*b*) *Penetration Methods.*—The various forms of apparatus for applying the penetration method all employ a cell which is divided by the fabric into two chambers. In one of these chambers an atmosphere of hydrogen is maintained at a definite pressure. Through the other chamber is passed a stream of air which carries away the hydrogen as it penetrates the fabric. The amount of this hydrogen is determined by burning it to form water and weighing the water after absorption in some suitable medium, or the percentage of hydrogen is determined in the stream of air passing over the fabric by means of the gas interferometer.

The apparatus of Barr and Rosenhain,[3] as used in the National Physical Laboratory, is shown in Fig. 2. The hydrogen from the electrolytic cell *K* passes through a series of washing and drying tubes into the permeability cell *G* and out through the water seal *H*. The air from the gas holder *A* after passing through a series of washing and drying tubes passes over the other side of the fabric, then through another series of drying tubes, through an electric furnace *F*, where the hydrogen is burned, and finally through the absorption tubes *C* and *D* which are to be weighed. The permeability cell is kept in a constant temperature bath.

The apparatus described by Heyn[4] and used at the Physikalischen Reichsanstalt is similar in principle though differing in form and detail.

Frenzel[5] made a notable improvement in this method by employing a Rayleigh-Zeiss gas interferometer for determining the concentration of hydrogen in the air stream after passing over the fabric. From the percentage of hydrogen so determined and the rate at which the air was passing, as determined by a gas meter, the permeability was easily calculated.

Experimental Apparatus

In the investigation of different testing methods several forms of apparatus were employed. The most useful apparatus and the one employed in all routine testing work as well as most of the experimental work is shown in Fig. 3. It applies the penetration method and employs a gas interferometer for determining the hydrogen passing through the fabric.

In this apparatus, the fabric is held in the permeability cell *a*, maintained at constant temperature in an air or water bath *h*. Pure, dry hydrogen passes over one side of the fabric and out through a water seal *g*.

Air after passing through the wet-pressure regulator *c* and a length of capillary tubing to reduce pressure fluctuations, is dried by bubbling through concentrated sulphuric acid in *e* and then passed over the other side of the fabric through a drying tube *d*[1] and into one chamber of the interferometer. It passes out through

[2] G. Austerweil, "Die Angewandte Chemie in der Luftfahrt." Published by R. Oldenbourg, München, 1914.

[3] Report of the British Advisory Committee for Aeronautics, p. 86, 1909-10.

[4] Sitz. der Königl. Akad. Wiss., p. 365, 1911.

[5] "Über die Gasdurchlässigkeit der Gummierten Ballonstoffe." Zs. fur Flugtechnik und Motorluftschiffahrt, 5, p. 264, 1914.

the drying tube d^2, which prevents diffusion of water vapor into the interferometer and then through the saturator f filled with glass beads partly covered with water and then through the wet meter m. The saturator is employed to prevent loss of water from the meter by evaporation into the gas being measured. When the interferometer is being read, the air stream is by-passed through the cock l into the wet meter so as not to interrupt the flow of air through the permeability cell. The pressure on the air and hydrogen sides is measured by U-gages i filled with oil and water, respectively. Dry air is passed through the other chamber of the interferometer to serve as a comparison gas, or it may be passed through both chambers when it is desired to obtain the " zero reading " of the interferometer.

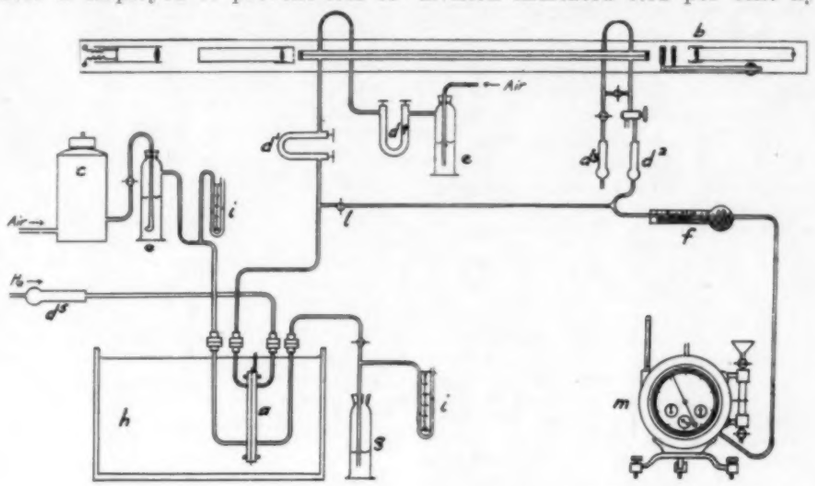

FIG. 3—DIAGRAM OF BUREAU OF STANDARDS APPARATUS

The gas interferometer and its uses have been described in detail by Haber and Lowe[6], L. Stuckert,[7] L. H. Adams,[8] and others. The Rayleigh-Zeiss type of gas interferometer measures the difference in refractivity of two samples of gas contained in two gas chambers 100 cm. long. Light from an illuminated slit passes through both chambers, after which the two beams combine to produce interference fringes which are observed through an eyepiece. The optical paths of the two beams can be brought to equality by tilting a glass compensator plate which is placed in the path of one of the beams. If the composition of the gas in one of the chambers is changed, the optical paths are different and the interference fringes are shifted. The fringes are brought back to their original position by tilting the compensator plate. The angle through which the compensator plate has been turned, which is measured by means of a drum attached to the micrometer screw, is a measure of the change in refractive index of the gas.

The instrument used for this work was of such sensitivity that one scale division indicated 0.01 per cent hydrogen in air when using air as a comparison gas.

The calibration of this instrument by a new method has been discussed by the author[9] in the Journal of the American Chemical Society. The interferometer furnishes a rapid and accurate method of determining the amount of hydrogen penetrating the fabric.

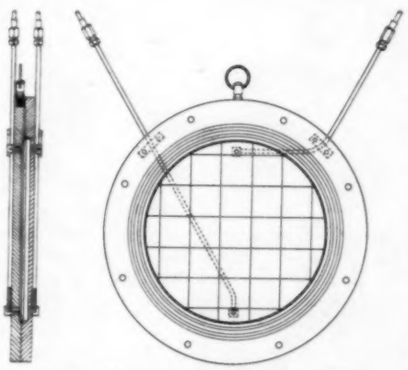

FIG. 4—BUREAU OF STANDARDS PERMEABILITY CELL

The permeability cells used are shown in greater detail in Fig. 4. The cell adopted as standard had a fabric area of 250 cm.^{2}; other cells having areas of 1000, 100, 50, and 25 cm.^{2} were constructed for experimental purposes. In designing these cells the gas and air chambers were kept small in volume in order to reduce the space which must be swept out when operating. A large mesh-wire screen (3 cm. openings) kept the fabric from being pressed against the back of the air chamber by the pressure of the hydrogen. The flanges of the cell contain a number of very fine grooves which take up the excess of grease used to make the fabric gas tight; they also give a better grip on the fabric. The two halves of the cell are held together by bolts and wing nuts (not shown in figure).

Connections to the gas and air lines and interferometer were made with small metal unions, and copper and glass tubing was used in making the connections to the various parts of the apparatus where necessary.

(*To be continued*)

[6] Haber and Lowe, Zs. f. Angew. Chem., 23, p. 1393: 1910.
[7] Stuckert, Zs. f. Elektrochemie, 16, p. 37: 1910.
[8] L. H. Adams, J. Am. Chem. Soc., 37, p. 1181: 1915.
[9] Edwards, J. Am. Chem. Soc., 39, p. 2382: 1917.

Nitrogen Content of Rubber

Some time ago it was necessary to determine the nitrogen content of a very considerable number of samples of plantation rubber, writes Matthew Howie in the *Journal of the Society for Chemical Industry*. The nature of the nitrogen compounds present in rubber is still uncertain, but it was thought that they would be fairly easily decomposed into ammonia, and this conjecture proved later to be correct. The method adopted was Wilfarth's copper sulphate modification of the Kjeldahl process.

It is very generally held that in Kjeldahl estimations, of whatever kind, the end point of the point at which digestion with sulphuric acid may cease is when the solution becomes clear. The factor which should decide the completion of any determination, however, is not the point at which the solution becomes transparent but that at which the nitrogen compounds present have been completely converted into ammonia. Owing to the large proportion of hydrocarbons present in rubber, it was found that in practically every case at least six hours was necessary to clarify the solution, and it was decided to carry out an investigation with a view to determining whether or not heating time could be cut.

In each determination about 1 grm. of rubber was digested with 30 c.c. of sulphuric acid, 7 grms. of potassium sulphate, and about 1 grm. of anhydrous copper sulphate. Six separate estimations were carried out in which after 1, 2, 3, 4, 5 and 6 hours respectively, the heating was discontinued and the nitrogen figure determined in the usual way. The mixture digested for six hours had become quite transparent, although not colorless; the others still contained varying proportions of suspended carbon. The results obtained are given in the following table.

Time of heating.	Plantation Sheet		Manihot Rubber.
	Sample I.	Sample II.	
Hours.	Nitrogen %.	Nitrogen %.	Nitrogen %.
1	0.19	0.31	0.68
2	0.20	0.30	0.70
3	0.23	0.32	0.72
4	0.24	0.33	0.72
5	0.23	0.32	0.73
6	0.24	0.32	0.72

The Rubber Age Trade Information Exchange

Inquiries on any rubber trade subject are solicited. Answers in many cases are sent by mail; others are printed below. Address all inquiries to Rubber Age Trade Information Exchange, 120 West 32d Street, New York.

Airplane Tires

Inquiry No. 50.—We are thinking of taking up the manufacture of airplane tires and shall be pleased to receive the latest information you have on this subject.

Answer.—We are pleased to give you the following up-to-date information regarding airplane tires. The Government specifications now call for airplane tires and tubes free from defective materials and workmanship, conforming with the following general construction, limits and texts:

Tires shall be of the clencher type, smooth tread, constructed of two or more cord plies of long staple cotton, so arranged that an equal number of plies run in each diagonal direction across the tire. Each ply shall be separated from the adjoining ply by rubber compound. Enough rubber compound must be put on side wall to insure ample protection of tire body. The thread stock shall have a minimum specific gravity of 1.30. The inside of the tires need not be painted.

Tire beads shall be constructed so as to insure against pinching and to properly fit the run contours shown in accompanying drawing and table.

The dimensions and weights of the finished tires shall be according to the following table and within the limits specified:

TIRE DIMENSIONS AND WEIGHTS

	Dimensions Size		Thickness		Weights	
	*Tire	Rim No.	Tread Min.	Side Wall Max.	†Maximum	Minimum
Millimeters	75/700	N 3	1.588	0.794	2.410 kilos.	2.123 kilos.
Inches (approximate)	28x3		1 1/16	1/32	5 lb. 5 oz.	4 lb. 11 oz.
Millimeters	100/700	Z 2	2.381	1.191	4.137 kilos.	3.851 kilos.
Inches (approximate)	28x4		3/32	3/64	9 lb. 2 oz.	8 lb. 8 oz.
Millimeters	125/700	Z 2	2.381	1.191	4.989 kilos.	4.650 kilos.
Inches (approximate)	30x5		3/32	3/64	11 lb. 0 oz.	10 lb. 4 oz.
Millimeters	150/800	Z 3	3.175	1.191	6.002 kilos.	5.615 kilos.
Inches (approximate)	32x6		1/8	3/64	13 lb. 4 oz.	12 lb. 6 oz.

* Section widths and tire decimeters, when inflated 50 lb. per sq. in. shall not vary more than 4 per cent or more than 2 per cent under nominal specified tire sizes.
† Weight without flap.

Marking

Each tire shall be branded with the manufacturer's name, size, serial number, and rim number the tire is intended to fit.

Tubes

Tubes shall be constructed of rubber, a "compound" to dimensions, sizes, weights and tolerance given in table, and shall withstand physical tests specified.

TUBE DIMENSIONS AND WEIGHTS

	Tire Size	Mandrel Size (Minimum)	Wall Thickness (Minimum)	*Weight (approx.)	Specific Gravity (Maximum)
Millimeters	75/700	47.63	1.194	0.4536 kilos.	1.25
Inches (approximate)	28x3	1 7/8	0.047	1 lb. 0 oz.	1.25
Millimeters	100/700	60.33	1.372	0.6804 kilos.	1.25
Inches (approximate)	28x4	2 3/8	0.054	1 lb. 8 oz.	1.25
Millimeters	125/750	76.20	1.575	0.9355 kilos.	1.25
Inches (approximate)	30x5	3	0.062	2 lb. 1 oz.	1.25
Millimeters	150/800	82.55	1.575	1.1911 kilos.	1.25
Inches (approximate)	32x6	3 1/4	0.062	2 lb. 10 oz.	1.25

* It is suggested that the maximum and minimum weights be specified for tubes as well as for tires.

Tube Tests

Tubes must withstand the water test mentioned under tire test and shall have the following physical properties:

Minimum tensile strength	1500 lbs.
Minimum stretch	600 per cent
Maximum et (2 minutes after rupture)	25 per cent

Valve

The valve to be used will be of the bent type with adapter for American and foreign pumps.

Tire and Tube Tests Combined

The manufacturer shall make a sufficient number of tests on tires and tubes coming through production to satisfy himself that the product satisfies the requirements of this specification.

Impact Test

The tire is mounted on with the tube on a special rim of standard contour that will withstand the pressures given in the table. The tube is inflated with air and maintained at a pressure of 150 lb. per sq. in. In this condition the tire must withstand a blow delivered on the thread by a weight of 181 lb. (82 kilos) having a contact surface which will be indicated in a diagram that will be published in an early issue of THE RUBBER AGE AND TIRE NEWS and falling through the distance indicated in the following table:

Tire Size in millimeters	Drop (181 lbs. weight) In Inches	In Millimeters
75/700	45	1143
100/700	55	1397
125/750	55	1397
150/800	55	1397

Water Pressure Test

All airplane tires from 75/700 to 150/800 millimeters, inclusive, when mounted on special rim of standard contour (to be illustrated in THE RUBBER AGE AND TIRE NEWS), shall withstand a water test of 200-lb. pressure not to be raised at a rate exceeding 50 lb. per minute.

Side Thrust Test

All airplane tires, from 75/700 to 150/800 millimeters, inclusive, when mounted on standard rims, inflated to 50 lb. air pressure, and loaded with a dead weight of 2000 lb., shall withstand lateral stress against a surface placed at an angle of 20 deg. with the horizontal, as will be shown in an illustration in THE RUBBER AGE AND TIRE NEWS, without pulling off the rim.

Phone Receiver Cushions

Inquiry No. 51.—We are in the market for a considerable number of telephone receiver cushions and wish you would put us in touch with makers of this article.

Answer.—Telephone receiver cushions are, we believe, classed among non-essential articles and their manufacture has been discontinued by several concerns that formerly produced them. However, they still can be obtained from the B. F. Goodrich Co., Akron, Ohio, and from the Davol Rubber Co., Providence, R. I. The New York office of the B. F. Goodrich Co. is at 1780 Broadway, and the Davol Rubber Co. has a branch office at 302 Broadway.

Tire Sizes

Inquiry No. 52—Please let us know what tire standards have been adopted and how soon the unstandardized sizes will be unobtainable. I am a subscriber to the RUBBER AGE AND TIRE NEWS.

Answer—The tire standardization question was treated at length in the May 25 and June 10 issues of the RUBBER AGE AND TIRE NEWS. Your questions are fully answered in those issues.

Technical Course in Rubber Manufacture

Inquiry No. 53—We are informed by your circulation department that it is impossible to secure back issues of THE RUBBER AGE AND TIRE NEWS containing the early installments of your Technical Course in Rubber Manufacture. We want this course in full. Are you going to put it in book form?

Answer—The supply of many issues of this paper containing the Municipal University of Akron's Technical Course in Rubber Manufacture, by Dr. H. E. Simmons, has been exhausted, but we intend soon to publish this course in book form to supply the big demand there is for it.

Tire Tread Patents

Inquiry No. 54—Kindly inform me as to the cost of patenting a design for a tire tread and give me the address of a good lawyer and other information you may think proper concerning this subject.

Answer.—The cost of patenting a tire tread would be approximately $35.00 for seventeen years. This cost would be divided as follows: investigation fee, $5.00; attorney fee, $10.00; Government fee, $20.00.

As to a patent attorney, we can refer you to Joshua R. Potts, 929 Chestnut Street, Philadelphia, Pa., who has considerable experience in handling patents relating to tires and other rubber articles.

Preparation of "Standard" Plantation Rubber*

By M. Barrowcliff, F.I.C.

Doubtless owing to conditions imposed by the war, the question of the preparation of a standardized plantation rubber has not, apparently, during the last three years continued to receive the attention that was formerly being paid to it. That little, if any, real advance has been made towards the solution of the problem is shown by the heavy premium which still persists in favor of Brazilian rubber. At the present time (February, 1918), the respective prices of "Fine hard Para" and plantation rubber are 2s. 8d. and 2s. 3d. per lb. When it is remembered that Para rubber shows, on washing and drying, a loss greater by about 12 per cent. than does plantation rubber, the premium in its favor is seen to be equivalent to 9d. per lb., or 33 per cent.

The reason for the obvious partiality shown by the manufacturer for Para is that plantation rubber, even of the highest grades, varies in quality, the variations being considerably greater than those found in different samples of fine hard Para. Much experimental work, dealing with the causes of this variability, has been published, notably by B. J. Eaton and J. Grantham. It was found that it is almost solely in respect of the time of heating required to ensure correct vulcanization, that is, to afford a vulcanized rubber having the best mechanical properties, that the variations occur. Samples of plantation rubber, prepared by the different methods in general use, were found to require for the correct "cure" widely varying times of heating, at a constant temperature. Further, rubber made by the same process, on different estates, and at different times on the same estates, was found also to vary greatly in this respect. When, however, the proper time of heating had been found and applied, relatively small differences were noted in the mechanical properties possessed by the vulcanized samples.

The fundamental fact established by Eaton and Grantham is that the time factor for correct vulcanization varies inversely according to the degree in which the rubber coagulum has been allowed to remain, subject to coagulation, unworked, and in contact with its serum. The longer this period the shorter the length of heating required to produce a correct cure.

Bearing this in mind, also the fact that the present custom is to machine the rubber on the day following coagulation, the influences exerted by the various factors introduced, in practice, into the manufacture of rubber from latex can be accurately foretold. The greater the extent to which the coagulum is machined, and the more completely the serum is consequently washed out, the slower the rate of "cure" of the rubber produced. This "crepe" rubber, as now marketed, is the slowest to vulcanize. "Sheet" rubber, which receives a much less drastic machining and retains a considerable quantity of serum, that drains out relatively slowly, cures in a much shorter time, whilst "slab," which receives no mechanical treatment and in which 12 per cent. to 15 per cent. of moisture is allowed permanently to remain, vulcanizes still more quickly.

In the preparation of "smoked" rubber two variables are concerned: (a) the action of the smoke products; (b) the temperature of drying. The former retards the rate of cure, whilst the latter, within the limits attained in practice accelerates it. Hence "smoked" sheet may cure either faster or slower than similar unsmoked sheet, depending on the balance of these factors in the earlier stages of drying.

In the case of unsmoked rubber the rate of drying similarly affects the vulcanization time factor. The same plantation drying-room may produce, on different days, according to the temperature and atmospheric humidity, rubber having different rates of "cure," even if the moisture content of the wet rubber happened, on each occasion, to be the same.

The amount of serum left in "sheet" rubber depends on the machining it has been given. Eaton found that the more concentrated the latex the more rapid is the rate of cure of the "sheet" afforded by it. The coagulum from the undiluted latex being thicker and harder, more serum is retained in it after the "rolling" process; the rate of drying, consequently, is slower than in the case of the thinner sheet afforded by the diluted latex, affecting, in the way expected, the optimum time required for the "cure." Similarly, "differential" rolls and rolls of equal size and speed will produce sheet rubber requiring differing times of "cure," other factors being constant. The effect of employing acetic acid to coagulate the latex (the usual method) is to retard markedly the rate of cure, as will be seen from figures given below. Little difference is occasioned, however, between acid-coagulated rubbers, by variations in the amount of acid that has been used, at all events within the limits met with in practice.

As is obvious from the foregoing, to produce a uniform rubber without some radical change in method would involve almost insuperable difficulties. One type of rubber only could be permitted; whilst present-day smoke houses, drying rooms, and much machinery, would have to be "scraped" in order that the necessary standardized mechanical treatment could be introduced. The way out of this difficulty is clearly indicated by Eaton and Grantham's further work.

It was found that the change which takes place in the rubber coagulum and causes the diminution in the time of heating required for vulcanization is completed in the course of a few days. This is shown by the following figures:

	Optimum Time of Cure, 2¾ Hrs. Hrs.	Breaking Load Kilos. per Sq. Mm. (a).	Elongation of Break (Orig. Length = 100) (b).	Product (a × b).
Pressed slab.				
Creped 1st day after coagulation	2¾	1.14	1,012	1,153
Creped 4th day after coagulation	1½	1.50	1,038	1,557
Creped 7th day after coagulation	1¼–1½	1.50	976	1.464
Creped 10th day after coagulation	1¼	1.51	1,032	1,558
Coagulum.				
Creped 1st day after coagulation	2½	1.25	997	1,246
Creped 4th day after coagulation	2	1.59	988	1,570
Creped 7th day after coagulation	1½	1.37	975	1,335
Creped 10th day after coagulation	1¼	1.38	1,001	1,381

In each case the latex was diluted to the same degree and coagulated with acetic acid. Although the maximum effect appears to be attained about the seventh day, it is seen that here is little change in the rate of vulcanization after three days, when the vulcanized rubber possesses the best mechanical properties. The slower progress of the change in the coagulum, as compared with the slab, is probably due to putrefactive changes having occurred. To obtain the best results, therefore, the coagulum should be left unworked for three days. It is then immaterial to what extent the rubber is worked, in what form it is finished, or how quickly or slowly it is dried, the time of "cure" not being affected to any significant extent.

If, however, coagulation is carried out in the usual way with acetic acid

* From the *Journal of the Society of Chemical Industry*, London.

in open vessels, the rubber coagulum undergoes changes, if kept such a length of time, which render the method unsuitable. Putrefactive action sets in, accompanied by darkening of the coagulum, whilst spot diseases, which have been shown to cause an extraordinary retardation of "cure," are likely to develop during the subsequent treatment.

A new procedure is required, therefore, and seems to be furnished by the method introduced by M. Maude and W. S. Crosse, known as the M. C. T. process. It is based on the fact that in closed vessels, latex coagulates completely without the addition of acid and without at the same time undergoing putrefactive changes. As now carried out in practice, large cement tanks provided with heavy water-sealed covers are used. These are filled with the bulked latex, leaving the smallest practicable air space. The covers are affixed and sealed and left undisturbed until the following day, when coagulation is found to be complete. The resulting coagulum is converted into "crepe" in the usual manner.

Addition may be made to each 100 gallons of latex of a quantity of a soluble calcium salt, e. g., calcium acetate or sulphate (gypsum), corresponding to 4 oz. of calcium. The effect of this is to accelerate the coagulation. A beneficial effect on the properties of the rubber may also be produced; but evidence on this point is not yet available. In this connection there merits notice the fact that whereas the soils of the Amazon region are well supplied with lime those of the Malay Peninsula are remarkably deficient in this respect. Further, the Para method of coagulation favors the retention of calcium compounds by the rubber, whilst acid coagulation tends to remove them. These points may be not without bearing on the causes of such differences as may exist between Para and plantation rubber.

"*Sheet*" *Rubber Manufacture*

For the manufacture of "sheet" the tanks are suitably partitioned. "Sheet" rubber so made contains usually a number of small bubbles. This can be obviated, if desired, by coagulating under a pressure of one or two atmospheres, which has the effect of keeping in solution the carbon dioxide of which the bubbles consist. For this purpose it is necessary to use iron pressure vessels provided with partitioned removable aluminum linings.

The following vulcanization results afforded by rubber prepared by this method are contained in a report by B. J. Eaton to Mr. Maude, then manager of the Cicely Rubber Estates (April, 1917):—

CREPE RUBBER

Source of Rubber.	Optimum Time of Cure.	Breaking Load Kilos. per Sq. Mm. (a).	Elongation at Break (Orig. Length = 100) (b).	Product (a × b).
Cicely Estate.	Hrs.			
Latex from old trees	2¾	1.37	990	1,356
*Latex from old trees	2½	1.30	955	1,293
*Latex from old trees	2¾	1.32	985	1,300
*Latex from old trees	2¾	1.34	990	1,326
Undiluted latex	2½	1.44	989	1,424
Undiluted latex	2¾	1.44	990	1,425
*Bulked latex (old and young trees)	2½	1.43	1,020	1,458
*Bulked latex (old and young trees)	2¾	1.39	1,008	1,401
Undiluted latex	2¾	1.52	1,007	1,530
The same, diluted 1:1	2¾	1.33	1,029	1,368
Latex from young trees	2½	1.34	1,005	1,346
*Latex from young trees	2½	1.35	1,009	1,362
*Latex from young trees	2½	1.41	993	1,400
Ratanui Estate latex	2½	1.38	1,000	1,380
Ratanui Estate latex	2¾	1.40	979	1,370

* Soaked before drying in sodium bisulphate solution to produce a pale crepe.

For comparison are given the following standard figures, afforded by good specimens of plantation rubber and fine hard Para.

Source of Rubber.	Optimum Time of Cure.	Breaking Load Kilos. per Sq. Mm. (a).	Elongation at Break (Orig. Length = 100) (b).	Product (a × b).
UNSMOKED SHEET				
Cicely Estate.	Hrs.			
Undiluted latex	1¾	1.34	1,028	1,377
Diluted latex (1:1)	2¾	1.41	999	1,408
Ratanui Estate latex	2½	1.38	960	1,324
SMOKED SHEET				
Cicely Estate.				
Undiluted latex	2	1.51	1,014	1,531
Undiluted latex	2¼	1.45	979	1,419
Diluted latex (1:1)	2½	1.38	934	1,358
Ratanui Estate latex	2¼	1.47	967	1,421
SLAB RUBBER				
Cicely Estate.				
Undiluted latex	1¼	1.50	960	1,440
Undiluted latex	1	1.45	1,005	1,457
Undiluted latex	1	1.47	978	1,437
Diluted latex (1:1)	1¾	1.50	962	1,443
Ratanui Estate latex	1¼	1.45	978	1,418
Ratanui Estate latex	1¼	1.30	940	1,222

Regarding these results, Mr. Eaton states: "All the samples possess excellent tensile properties, equal to the best samples of plantation sheet and crepe, and prove that the process is capable of producing rubber of excellent quality." It is to be noted that all the above rubber was manufactured within 24 hours of coagulation. This accounts for the difference in the rate of cure shown by the three types, slab, sheet, and crepe.

The uniformity of the samples of crepe rubber is remarkable, considering that they represent the produce of old and of young trees; of pure latex and latex diluted with water; of rubber made on different days. The rate of cure is seen to be more rapid than in the case of the standard sample of crepe, a result attributed by Eaton to the absence of acid.

The above figures are given in order to show that this method of coagulation affords, at least, rubber equal in all respects to the best now being produced by acid coagulation and of greater uniformity. The point upon which stress requires to be laid, however, is that it is a process, and seemingly the only practical one, by which the coagulum may be allowed to mature for the length of time essential for eliminating the differences that otherwise result from unstandardized subsequent treatment.

For the production of "standard" rubber the bulked latex from a day's tapping reqpires to be placed in the coagulating tanks, as described above, and allowed to remain undisturbed for a fixed time, which, it is suggested, should be three days. Under these conditions no putrefaction occurs and the coagulum remains perfectly white, except for a slight surface darkening.

Judging by the considerations advanced above, the rubber so produced, whatever the source, or whether finished as crepe or sheet, would show no variations in the time of heating required under standard conditions for correct cure, whilst the vulcanized material would possess the maximum attainable tensile strength. The cure would be substantially quicker than that of Para under similar conditions, but this is an advantage as it enables the manufacturer, whilst heating for the same length of time, to vulcanize at a lower temperature, which is all to the benefit of the finished material.

The result of the general adoption of the above described *modus operandi* would be the production of a plantation raw rubber as uniform in its vulcanizing properties as fine hard Para, and one affording at least an equally satisfactory vulcanized product.

Titane Oxide Accelerator

British rubber manufacturers are using titane oxide as a filler and accelerator. Its effect upon rubber is said to be comparable to that of zinc oxide, but much more powerful. Titane oxide increases the tensile strength of the product and at the same time acts as an accelerator.

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THE RUBBER AGE AND TIRE NEWS

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DIFFERENCE of opinion prevails among steel makers and manufacturers of steel products as to the supply of material the so-called lesser essential industries may expect in the future. Steel makers believe that the Government demands will absorb far more metal than was expected when war needs were first given preference over all civilian consumption. Automobile manufacturers believe that the situation will tend to ease somewhat and that they should be allowed at least sixty per cent of their normal tonnage, which amount they claim is essential to save their industry from probable disaster.

At a conference held last week automobile manufacturers were told by officials of the War Trade Board that there was little hope of their getting more than twenty-five per cent of their requirements and they were instructed to submit within two weeks sworn inventories of steel and steel products now on hand at their several plants.

What effect a curtailment in the output of automobiles may have on the rubber industry—in which automobile tires constitute by far the largest item of production—is difficult to predict. If the restriction extends over a considerable period of time there surely will be a falling off in the demand for tires.

Tire manufacturers now have all they can do to keep production up with demand, and there is no apparent possibility of this demand decreasing for many months.

Railroads and Motor Trucks

The difficulties of shipping by rail, wholesale cutting down of railroad facilities, endeavors to check unnecessary traveling by train, all indicate that the railroads are suffering from prevailing conditions far more than is realized by the general public. Difficulties in the matter of labor, coal and other supplies do not alone account for the present state of railroad transportation, for which an explanation must be sought in the direction of the condition of the permanent roads and rolling stock.

It is becoming apparent to all those who are compelled to travel that the railroad lines are deteriorating and rolling stock is not being maintained in accordance with normal railroad standards in this country.

This leads to the impression that after the war, when we hope to gradually return to normal conditions, it will be a long time before the railroads will be able to handle their proper proportion of freight traffic.

Assuming this to be the case it is not improbable that the use of motor trucks will become firmly established in our scheme of industrial and commercial transportation.

However, the present extensive use of motor trucks, though it is away beyond any prediction of a year ago and promises to grow steadily for several years to come, does not justify the opinion some persons hold that motor trucks will become big competitors of the railroads. A close analysis of transportation conditions shows that the motor truck is rather the railroad's ally than its competitor.

The type of service the motor truck best renders is the type the railroad least efficiently gives, and if our railroads can be permanently freed of the burden of this unsuitable service, their capacity for profitable operation can be largely increased.

It is generally conceded that the short haul is the least profitable source of railroad revenue. This type of service usually involves partial loads and frequent stops, which are expensive. On short hauls the railroads operate far below their full efficiency, and consequently at unnecessary expense.

For short hauls the motor truck is ideal and in this service it can operate greatly to the benefit of the railroad. Its unit load is smaller, its operation is more flexible and does not require expensive tracks and terminals. By taking over short haul service, the motor truck releases railroad rolling stock for more profitable long hauls with full loads.

The improvements that have been made in recent years in the manufacture of solid rubber tires and the advent of practicable pneumatic tires for motor trucks, have greatly broadened the field for motor truck usefulness. The giant pneumatic tire is promoting the motor truck from the slow-moving class of vehicles to which it was confined by its solid rubber tire equipment, just as the solid rubber tire put it above the slow-moving steel-tired road machine.

In heavy truck service large pneumatic cord tires save materially in gasoline and oil consumption, and greatly reduce truck depreciation. They practically decrease the danger of load breakage, and permit speeds that with other types of tires would be of prohibitive cost. Truck manufacturers report an increasing demand for pneumatic tire equipment, which surely means that these tires already are successful in extending the practical use of motor trucks.

Government Action Affecting Rubber

War Industries Board Investigating Problem of Allocation—Restriction on Importation of Plumbago Extended—Sulphur Under Control—Month of June Shows Big Increase in Crude Rubber Imports

Allocation of Crude Rubber

The War Industries Board has requested that the War Service Committee of the Rubber Industry of the U. S. A. furnish information regarding the quantity of crude rubber used in production of specific classes of goods during the three months' period January, February and March, 1918, as compared with the same period of 1917; also during the period April, May, June, compared with the same period of 1917.

This information is required in connection with the problem of allocation. Its importance and the imperative necessity of furnishing it promptly is consequently obvious. Questionnaires for this information have been sent to all rubber manufacturers, together with a request to fill them out immediately and in confidence, the replies to be mailed to Irving B. Ferguson, C. P. A., 61 Broadway, New York City, not later than August 1.

All questionnaires must be returned and manufacturers who for some reason or other cannot answer the questions must state so on the questionnaires when they return them. All figures will be subject to Federal verification.

Each question must be answered separately and total poundage must not be reported in bulk for two or more questions, as was done by some manufacturers in connection with the War Service Committee Questionnaire No. 1. For example, a manufacturer must not report total poundage for the entire tire and tube department of his plant.

The War Industries Board requests that this information be furnished on the first of each month hereafter, and questionnaires will accordingly be mailed to manufacturers in time for them to furnish figures by the first of each month.

Restriction on Importation of Plumbago

The restriction upon the import of plumbago or graphite has been extended by the War Trade Board, to be effective for the entire calendar year of 1918. Under the List of Restricted Imports No. 1 this restriction was made absolute until July 1 of this year, the possibility of importing not to exceed 5000 long tons for the remainder of the year being left open should investigation prove that stocks in this country were inadequate to meet the home requirements for the entire year. As a result of the investigation, it has been found that present stocks, together with the home production, suffice to meet the home requirements until well into 1919. The restriction has therefore been continued in effect and the Bureau of Imports has been instructed to issue no licenses for the importation of plumbago or graphite for the rest of the year.

Imports from Canada Need Licenses

After July 8 all shipments of articles of non-Canadian origin imported from Canada and Newfoundland will require individual import licenses similar to those required for imports from other countries. This ruling by the War Trade Board is made to prevent evasions of the general import regulations. Some concerns have been making sea shipments to Canada of restricted commodities and then import them by rail to the United States. Goods of Canadian origin will be granted entry, but will require individual import licenses.

War Industries Board Controls Sulphur

The War Industries Board has passed a resolution, approved by the President, taking over control of the production and distribution of sulphur materials. This was made necessary by the increased demand from the Government for sulphur in the manufacture of explosives and for other purposes and by the increasing burdens on the rail and water systems in the transportation of materials.

William G. Woolfolk, chief of the section in charge of sulphur and pyrites, has been named to act for the War Industries Board in controlling the production and distribution of sulphur materials, availing himself of such voluntary assistance as he may see fit.

Ban Graphite for 1918

The importation of graphite or plumbago has been extended to be effective for the entire calendar year 1918 by the War Industries Board. Under the list of Restricted Imports No. 1 this restriction was made absolute until July 1 of this year.

As a result of investigation, it has been found that present stocks, together with the home production, meet the requirements well into 1919. The restriction has been continued and the Bureau of Imports has been instructed to issue no licenses for the importation of plumbago or graphite for the rest of the year.

Government Purchases of Rubber Goods

Contracts and Purchases for rubber goods recently awarded by the Army Medical Corps are as follows:

Empire Rubber & Tire Co., Trenton, N. J., clarifying tubes; Hodgman Rubber Co., Tuckahoe, N. Y., syringes and rubber tubing; United States Rubber Co., New York City, rubber gloves; Miller Rubber Co., Akron, Ohio, caterers.

Contracts recently awarded for rubber goods by the General Engineering Depot, War Department, are as follows:

B. F. Goodrich Rubber Co., Akron, Ohio, rubber fire hose, etc.; Anchor Packing Co., Baltimore, Md., hydraulic and rubber packing; Thermoid Rubber Co., Trenton, N. J., hydraulic compressed brake lining; Goodyear Tire & Rubber Co., Philadelphia, Pa., hose, etc.

Contracts and Purchases approved by the Surgeon General of the Army are:

Davol Rubber Co., New York City, rubber tubes.

Information concerning the following Government contracts recently placed with rubber companies has been released by the Committee on Public Information.

Goodyear Tire & Rubber Co., Akron, Ohio. Clarifying tubes and chin rests.

The Quick Tire Service Co., Louisville, Ky. Rubber tires.

Goodyear Tire & Rubber Co., Akron, Ohio. Airplane fabric.

The Duratex Co., Newark, N. J., is also on the list.

Can Replace Rubber for Expresses

The War Trade Board has ruled that Government controlled express companies shall be considered as other departments of the Government. Therefore rubber used on contracts for these companies is subject to replacement without regard to allocation. This ruling is effective as of July 1, 1918.

Partial Shipments on Export Licenses

The War Trade Board directs the attention of shippers to the fact that the new procedure covering partial shipments on export licenses as announced in the Rules and Regulations of the War Trade Board No. 2, May, 1918, will be operative on and after July 10, 1918. This procedure was first announced as being effective June 1, but this date has been changed to July 10, as noted above.

Heretofore partial shipments from interior points, or at ports of exit where the license itself could not be readily presented, have been made by means of a special partial shipment certificate sworn to before a Notary Public or a Certificate of Transfer drawn by a Collector of Customs. The use of these forms, EAB-23 and WTB-176, will be discontinued, and on and after July 10 partial shipments against export licenses may be made in the following manner except in instances when the license itself can be presented at the port of exit.

The shipper will prepare a Shipper's Export Declaration in quadruple and will endorse upon the back of the license in the space provided for the purpose the full details of the partial shipment he desires to make. He will then present the Declaration (4 copies) and the license (with the partial shipment endorsement on the back) to any postmaster of the first or second class or to a Collector of Customs. The postmaster or collector to whom the papers are presented will compare them, and if they agree in fact, that official will countersign and date the partial shipment endorsement on the back of the license and will stamp all four copies of the Shipper's Export Declaration with an official partial shipment stamp and sign and place his seal on such stamp. He will then return the license and all four copies of the Declaration to the shipper. The Collector of Customs at port of exit will allow the partial shipment to proceed upon presentation of the Declaration, so stamped, signed and sealed.

Shippers located in cities where there are no Collectors of Customs, but where the post-offices are of the first or second class, may communicate with their postmaster and ascertain at which post-office station, if more than one, and at which window this service will be rendered. The attention of shippers is called to the fact that postmasters in cities wherein are located Collectors of Customs will not exercise this authority. Shippers in such cities may apply to a Collector of Customs.

Large Increase in Rubber Imports

During the month of June imports of crude rubber took a big jump, an increase of 7836 tons being shown over the quantity which came in during May. The total amount imported for the first six months of 1918 was 99,468 tons. This is 11,387 tons more than were imported during the same period of 1917.

The big increase shown during June probably is due in a measure to anticipation of the action of the War Trade Board in limiting exports. The quantity which is to be allowed to come in during the period from May 6 to July 31 has been set as 25,000 tons, which will make an aggregate total of 100,000 tons for the entire year. The following statistics were compiled by the Rubber Association of America.

Month	1917, tons	1918, tons
January	12,788	16,084
February	10,162	13,108
March	18,624	17,161
April	13,000	12,703
May	18,411	16,288
June	15,096	24,124
Total	88,081	99,468

News of the Rubber Trade

McWilliams Becomes Manager of Firestone Cycle Tire and Accessory Department—Fifty Thousand Attend Akron Annual Field Meet—Average Earnings of New York Rubber Workers Larger

Firestone Promotes McWilliams

The Firestone Tire & Rubber Company, Akron, Ohio, has announced the appointment of F. W. McWilliams as Eastern Cycle Tire & Accessory Sales Manager.

F. W. McWILLIAMS

Mr. McWilliams has been connected with the Firestone Company's Cycle Tire & Accessory Sales Department since joining the company and his exceptional ability along these lines has earned him quick and steady promotion.

Previous to joining the Firestone Company, Mr. McWilliams was western representative for *System Magazine* and before that had been for many years in business for himself.

Fraser Manages Pennsylvania Co.'s Branch

Roy S. Fraser has been placed in charge of the New England branch of the Pennsylvania Rubber Co., taking the place of Wallace Durrell, who has joined the United States Army.

Rubber Parts for Airplanes

The number of rubber parts used on airplanes is increasing rapidly. Perhaps no one has had more to do with the development of this feature of the rubber industry than Edgar H. Wilson, president and general manager of the Dural Rubber Corp., Flemington, N. J. Several years ago Mr. Wilson saw the possibilities for using rubber on airplanes and began a personal study of the subject. As a result of his work, special rubber shock absorbers, grip handles, hose, washers, matting, grommets, inner tubes, pads for reducing wear and vibration, stream lining for axles, wire and tail skids, and tubing for acids, oil and gasoline were developed and the Dural Rubber Corp. formed to produce these specialties. When we entered the war the Dural Corporation was ready and has supplied much of the rubber equipment for our aircraft.

Mr. Wilson spends several days each week in airplane factories throughout the country studying engineering problems that can be solved by the use of rubber.

Increased Sumatra Rubber Shipments

Consul Horace J. Dickinson, detailed as vice-consul at Batavia, Java, reports:

Exports of plantation rubber from Belawan, Deli (Sumatra), increased from 16,418,000 lb. for 1916 to 28,949,000 lb. in 1917. The countries of destination were as follows:

Countries	1916 Pounds	1917 Pounds
United States.....	8,340,000	20,136,600
Holland	28,000	.....
Great Britain.....	5,636,000	5,416,400
Canada	20,000	8,800
Straits Settlements.	2,394,000	3,333,000
Hongkong	.....	13,200
Japan	.....	41,800
Total.....	16,418,000	28,949,800

Earnings of New York Rubber Workers

The average weekly earnings of workers in the rubber trade, including office employes, in New York State during March, 1918, amounted to $16.34, as compared with $14.42 during the same month of 1917, $12.10 during the corresponding period of 1916, and $11.29 during March, 1915, according to a report of the Bureau of Statistics and Information of the New York Department of Labor.

Williams in Market for Machinery

The Williams Foundry & Machinery Co., 60 Cherry Street, Akron, Ohio, is in the market for a 10-in. vertical boring mill and a 5-in. back geared lathe with 35-in. bed, according to a report from the rubber metropolis.

Akron Annual Field Meet

Fifty thousand rubber workers paused while athletes of the three largest rubber factories—Goodrich, Goodyear and Firestone—competed in their annual Triangular track and field meet. For the second time Goodrich cinder path and weight men triumphed over their rivals, the scores being as follows: Goodrich 92½, Goodyear 33, and Firestone 18½.

College stars, now workers in the rubber industry, from Missouri, Harvard, Dartmouth, Ohio State, Wisconsin, Penn State, and other schools from almost every section of the country made time and records which compare favorably with those recorded in some of the largest intercollegiate meets. Herold, of Goodrich, covered the two miles in 10:26 and Filley of the same team ran the 220-yard dash in 22 1-5 seconds. The meet was staged in a downpour of rain.

Three of America's foremost track wizards acted as officials. They were Harry Gill, track coach of Illinois University; Tom Keane, coach and trainer at Syracuse University, who himself has run in over 3000 dashes in England and this country; and Frank Castleman, track mentor at Ohio State University. These men were amazed at the speed and form of the Akron rubber workers and as Gill expressed it: "I would like to have three or four of those men at Illinois."

Industrial recreation, which has probably attained the highest degree of perfection in Akron, is a thing to be reckoned with in the future. The Goodrich track team is planning meets with large concerns such as the Westinghouse Electric Co., at Pittsburgh, Pa., and the National Cash Register Co., at Dayton, Ohio.

Akron rubber companies maintain mammoth athletic stadiums, with prominent ex-college coaches as instructors.

On the left above, Edward Steele, weight man; below, Earl Filley, star sprinter, who finished first in the 100, 220 and 440 yard dash. In the upper right hand picture are the following members of the Goodrich track team: (left to right) O'Meara, manager; Foster, Davies, Pickett, Filley, Cummongs, Fellers, Seeds, Saltzman, Herold, Allison, Gressing and Eddie Connelly, athletic director. In the oval, Eddie Connelly, formerly assistant to Tom Keane, Syracuse coach. Below are some of the trophies annexed by Goodrich athletes since Connelly took charge of recreation at the big Akron factory. In the center on the right is "Bill" Herold, crack distance runner, who won over Goodyear and Firestone runners in the only events he entered—the one-half, mile and two mile runs.

American Rubber Patents

ISSUED JUNE 4, 1918.

1,268,185—To Harry William van Meeteren, Birmingham, England, assignor of one-third to Amos Edwards and one-third to Henry Headley, Birmingham, Eng. Mode of and means for assembling pneumatic or elastic tires in relation to rims or wheels.

1,268,210—To Richard S. Bryant, Akron, Ohio, assignor, by mesne assignments, to The Standard Parts Company, Cleveland, Ohio, a corporation of Ohio. Rim for vehicle wheels.

1,268,536—To Harry C. Atwood, Minneapolis, Minn., assignor to Durkee-Atwood Co., Minneapolis, Minn., a corporation. Tire-patch.

1,268,542—To Cisco Bullivant, Spokane, Wash., assignor of one-half to Walter Zent, Spokane, Wash. Tire-rim-reducing device.

1,268,639—To Edward Mark Slocum, Medan, Sumatra, Dutch East Indies, assignor to General Rubber Company, a corporation of New Jersey. Process for treating latex and products obtained thereby.

1,268,798—To Timothy S. York, Haverhill, Mass., assignor to Louis H. Harriman, Haverhill, Mass., trustee for said York, W. Scott Peters, Samuel E. Cass, and Frank M. Whitehouse, Haverhill, Mass. Demountable wheel-rim.

1,268,799—To Timothy S. York, Haverhill, Mass., assignor to Louis H. Harriman, Haverhill, Mass., trustee for said York, W. Scott Peters, Samuel E. Cass, and Frank M. Whitehouse, Haverhill, Mass. Collapsible rim.

1,268,211—To Richard S. Bryant, Cleveland, Ohio, assignor by mesne assignments, to The Standard Parts Company, Cleveland, Ohio, a corporation of Ohio. Rim for vehicle wheels.

1,268,258—To William H. Manuel, Terre Haute, Ind., assignor of one-half to James A. Chandler, Terre Haute, Ind. Armor for pneumatic tires.

1,268,298—To John L. Swartz, Akron, Ohio. Cushion-tire and process of producing the same.

1,268,367—To Benjamin R. Lee, Chattanooga, Tenn. Demountable rim.

1,268,408—To Warren Tirrell, Brockton, Mass. Composite outer-sole.

1,268,432—To James Cavanagh, Boston, Mass., assignor, by mesne assignments, to United Shoe Machinery Corp., Paterson, N. J., a corporation of New Jersey. Shoe.

1,268,437—To Lee Clough, Akron, Ohio, assignor to the Firestone Tire & Rubber Co., Akron, Ohio, a corporation of Ohio. Solid tire.

1,268,477—To William G. Lerch and Chauncey P. Whisler, Akron, Ohio, assignors to The Miller Rubber Company, Akron, Ohio, a corporation of Ohio. Heel-trimmer.

1,268,525—To William M. Wirth, St. Louis, Mo., assignor to St. Louis Welding & Mfg. Co., St. Louis, Mo., a corporation of Missouri. Separable demountable rim.

1,268,526—To William M. Wirth, St. Louis, Mo., assignor to the St. Louis Welding & Mfg. Co., St. Louis, Mo., a corporation of Missouri. Demountable rim.

1,268,527—To Samuel J. Woods, Newport, R. I., and John Polar, Cleveland, Ohio. Resilient tire.

ISSUED JUNE 11, 1918

1,268,924—To Herbert A. Burch, Kalamazoo, Mich. Tire.

1,268,931—To Burton G. Cope, Orrville, Ohio. Anti-skid device, for automobile wheels.

1,268,957—To John Gabrielson and Gustaf E. Swenson, Springville, N. Y. Spring-tire.

1,269,124—To Jesse M. Smith, Pittsburgh, Pa. Blow-out patch.

1,269,155—To John H. Brown, Chicago, Ill. Resilient heel and anchoring washer therefor.

1,269,168—To Frank A. Fahrenwald, Cleveland, Ohio. Process of treating rubber.

1,269,229—To Michael Smith, Passaic, N. J. Method and apparatus for manufacturing tires, hose and the like.

1,269,286—To William F. Kopke, Dayton, Ohio. Resilient wheel.

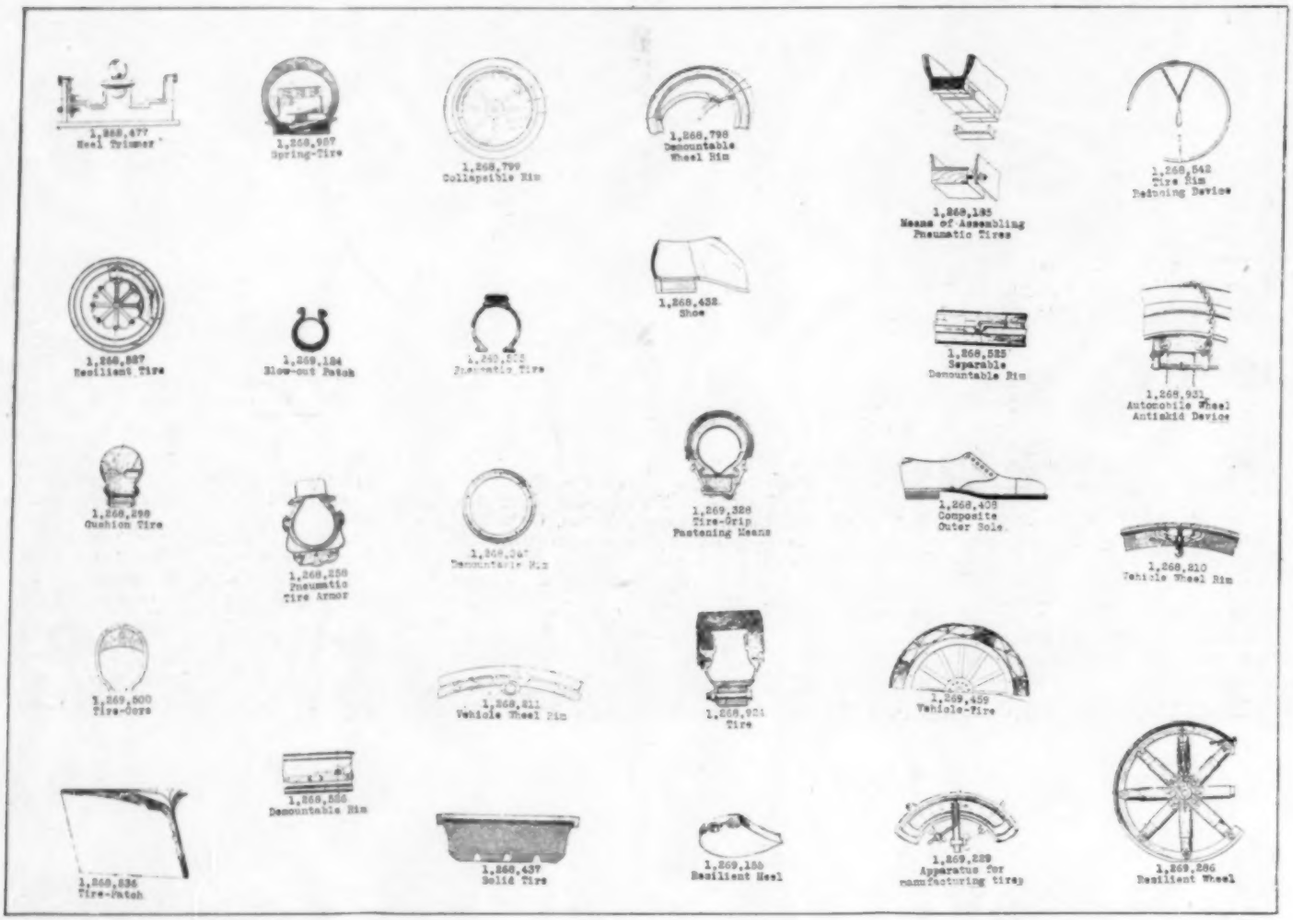
1,269,328—To Patrick Smith, Forestville, Cal. Fastening means for tire-grips.

1,269,420—To Willis A. Gibbons, Flushing, N. Y., assignor to The Goodyear's India Rubber Glove Mfg. Co., a corporation of Connecticut. Process of forming airplane structural elements.

1,269,459—To Frank C. Kotze, Newark, N. J. Vehicle-tire.

1,269,500—To Frederick Paulson, Minneapolis, Minn. Tire-core.

1,269,505—To Leonard R. Poschadel, Milwaukee, Wis. Pneumatic tire.



Incorporations

Naugatuck Tire & Rubber Co., Inc., New York City; capital, $10,000. To manufacture tires.

Roberts Tire Co., Inc., New York City; capital, $25,000. To distribute solid rubber truck and pneumatic tires.

The Gerhardt Tire Sales Corp., Albany, N. Y.; capital, $1,000. To sell tires.

American Rubber Products Co., Wyoming, Del.; capital, $2,100,000. To construct rubber plants and manufacture articles from rubber.

Power Rubber Co., Wyoming, Del.; capital, $2,500. Incorporators: H. L. Smith, F. G. Carpenter, F. H. Townsend.

Valley Tire Co., South Bend, Ind.; capital, $10,000. To manufacture and sell automobile tires.

Rebuilt Tire Co., South Bend, Ind., has changed its name to Super Tread Tire Co.

Reliable Tire & Vulcanizing Co., Rockford, Ill.; capital, $5,000. Incorporators: E. G. Peterson, A. L. Peterson, E. M. Peterson.

Embry-Rapier Co., Louisville, Ky.; capital, $10,000. To buy and sell automobile tires and accessories.

Toledo Tire Co., Boston, Mass.; capital, $25,000. Incorporators: W. Alexander, Herman Blumenthal, G. L. Ellsworth.

Surety Tire and Rubber Company, to deal in rubber goods of all kinds; capital, $1,000,000. Incorporators: William L. Burgess, Otto L. Menzing, A. E. Koerner, St. Louis, Mo.

Fox Tire and Rubber Company, to deal in rubber tires and rubber goods; capital, $500,000. Incorporators: J. T. Jones, F. S. Danenberg, Ira P. Good, Milwaukee, Wis.

The Perfection Truck Tire Co., Chicago, Ill.; capital, $25,000. Incorporators: F. H. Drury, W. A. Hamilton and W. L. Pollard.

TIRE NEWS

Outdoor Advertising*

By Clyde S. Thompson

The Miller Rubber Company have a very attractive display on the painted boards. It carries out the same idea they use in the magazines —"uniform tires." And just as in the magazines they have featured a husky tire builder, so on the painted boards they feature the same man pointing to a huge Miller tire. Both the figure of the man and the picture of the tire are outlined and extend above the limits of the board proper.

While this feature adds a little bit to the cost of construction it undoubtedly serves to break up the monotony of the standard size board and concentrates the eye upon two predominant spots. Miller have linked up their outdoor displays with their magazine advertising more consistently than other tire advertisers who are using both mediums. The magazines carry the message in detail, while the painted boards epitomize the story. You will note in the accompanying illustration that they require only thirteen words to put the Miller story across with a punch.

While the writer took the liberty of criticizing the magazine advertising of the Lee Tire Company in these pages a short time go, he doffs his *chapeau* to them

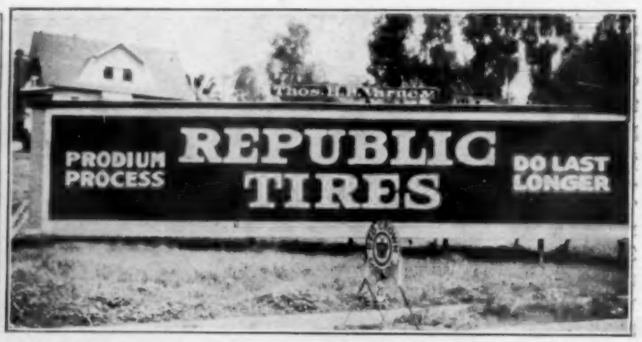
* Concluded from last issue.

in recognition of the splendid painted boards that they are using. Their magazine advertising was criticised because it was confused in detail and distinctly hard to read.

The Lee painted board, however, is a gem as will be noted in the accompanying illustration. It would be hard to improve upon the simple dignity and strength of this display. Those who have motored around New York and have come across any of the Lee boards will undoubtedly remember the splendid impression they made.

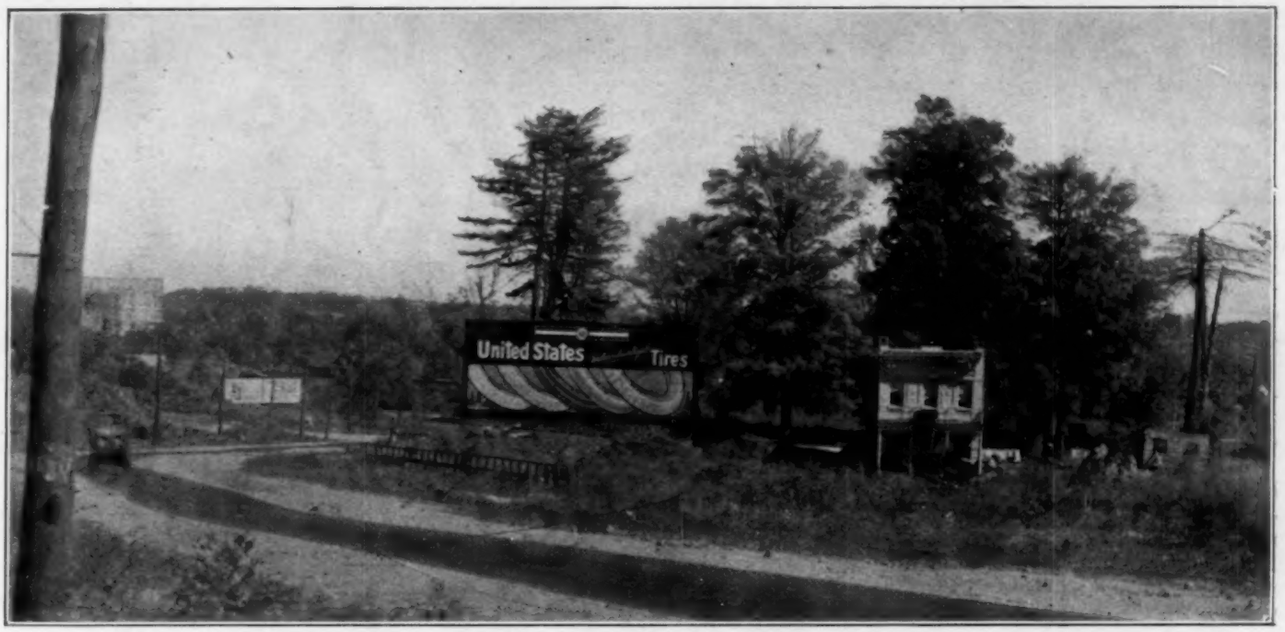
It is difficult to judge the value of painted boards from photographs because the color values are lost in a black and white print. So it may be possible that the Republic Tire boards are attractive in color, but not having seen them I do not know. But the photograph leads one to believe that the designing of these boards was entirely perfunctory: there is no apparent idea concealed anywhere around the premises and no effort has been made to tie up the painted display with their magazine advertising.

You can't lose the words "Mohawk Tires" in the Mohawk display. One criticism I would make of the Mohawk board is that they show their tire in a horizontal position. Motorists seldom see an actual tire in that position and though it may seem like a small matter the writer has observed that the representation of a tire is most effective when it is shown in approximately the same position



it assumes when it is in use. I note further that the Mohawk people still use the word "quality" as a slogan. There are some words that have been so often used as to lose their value in the public mind. The word "quality" has been the most abused word in the English language. Every manufacturer claims quality for his goods whether they have it or not. "Quality" is an intangible thing and makes no particular appeal to the public unless it is backed up with a statement of what the quality consists. The Goodrich Company defines a claim for quality when they assert that Goodrich tires are "Best in the long run." Miller is asserting a quality that may be understood when it claims "uniform tires." Firestone is asserting quality when it claims "More miles per dollar," but these assertions are full of meaning and make an impression upon the

Representative Tire Bill Boards



mind that the mere word "quality" misses entirely. The mere use of the word proves nothing.

Firestone has gotten entirely away from the standard size boards and concentrate upon a display that is approximately 6 ft. high and 12 ft. long. If I did not know the Firestone Company as well as I do, and were to judge from its painted boards, my opinion would be a very poor one. Frankly, these small and cheap boards do not seem to be in keeping nor in company with the prestige and standing of the Firestone Company. By referring to the reproduction of their board pictured herewith you can readily see the justice of this criticism.

In addition to the companies already mentioned the Michelin, Brunswick, Century, United States, Pennsylvania, Dreadnaught and other rubber companies are all represented by painted boards; some with displays that are decidedly good and some with displays that are very much to the contrary. But even a mediocre board is so much better than no board at all that these companies are certainly to be commended for their recognition and use of a splendid advertising medium.

Personal Notes of the Tire Trade

Klein New Advertising Manager of Racine Rubber—Goodyear Promotes Dine—Sterling Makes a Change—R. E. Lee Succeeds D. R. Kennedy—Republic Has New Branch Manager—Preston a Navy Lieutenant—U. S. Tire Promotes Whidden

Klein Succeeds Gilmour

M. Klein has been appointed assistant advertising manager of the Racine Rubber Co., Racine, Wis., succeeding J. V. Gilmour, who has been called to the colors. Mr. Klein will work under C. R. Collins, advertising manager for both the Ajax Rubber Co., Inc., and Racine Rubber Co.

J. M. Dine in Chicago

J. M. Dine, for the past five years manager of the Omaha branch of the Goodyear Tire & Rubber Co., has been appointed assistant manager of the Chicago branch of the same company. C. A. Cramer of Cedar Rapids, Ia., succeeds Mr. Dine as manager at the Omaha branch.

New Branch Manager for Mason

J. A. Scullin has been appointed manager of the Cleveland Branch of the Mason Tire & Rubber Co., Kent, Ohio.

C. K. Whidden Promoted

C. K. Whidden for several years connected with the Philadelphia, Pa., sales force of the United States Tire Co., has been appointed assistant manager of the motor truck tire department of the company, with headquarters in New York.

Wadleigh Appointed Manager

Corliss Wadleigh has been appointed manager of the New England branch of the Republic Tire Corp., succeeding W. S. Carleton, who has entered the service.

Smith Heads J. & D. Tire

At the meeting of the Board of Directors of the J. and D. Tire Company, W. F. Smith was elected president and general manager, and E. M. Downs was made vice-president and factory manager. R. L. De Lisser remains secretary of the company.

R. E. Lee on Insurance Committee

R. E. Lee, of the Firestone Tire & Rubber Co., Akron, Ohio, has been named by Governor Cox to succeed D. R. Kennedy, of Youngstown, Ohio, as member of the State Health and Old Age Insurance Commission. Mr. Kennedy has resigned to become a member of the Federal Shipbuilding Commission.

R. A. D. Preston Commissioned

R. A. D. Preston, formerly of the Balloon Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has been commissioned lieutenant senior grade in the Navy and has been given charge of the upkeep and repair of dirigibles and Navy Balloons for the United States.

Sterling Change

P. J. Kerrigan has been appointed Traffic Manager of the Sterling Tire Corp., Rutherford, N. J., under the management of Pablo Homs.

Happenings of Interest to Tire People

U. S. Training Soldiers to Repair Tires—Insurance for Sterling Employes—British and American Tire Standards—New York Hotels to Have Garage—Uses Thrift Stamps to Pay for Freight Charges

Tire Repair School for U. S. Soldiers

One of the most interesting and important phases of military activity in and around Akron, Ohio, the rubber tire center of the world, are the United States Army Tire Repair Schools where the young soldiers are given careful instruction in the building and repairing of casings and tubes.

In the case of the Miller Rubber Company, where Miller "Geared-to-the-Road" tires are manufactured, the class is conducted in the large service station across the street from the factory. Each month a class of enlisted men puts in four weeks of diligent work in an effort to master the mysteries of tire construction. There are six hours of work each day. The detachment is under command of Capt. A. E. Aub and is quartered, when not in the class room, in barracks on the campus of Akron University.

When the four weeks of tire study have been concluded, each man must pass an examination of 29 questions concerning tire building and repairing. He is then graded according to his proficiency, as shown by his answers to the examination questions. That the young soldiers are unusually good students is indicated by the average standing of the class of June. There were 107 men taking the course at various plants in Akron and the average grade was 90 per cent.

In the Miller school, and the same situation prevails elsewhere, tire men of long experience are instructors for the soldier-students. The Miller students are never allowed to handle customers' tires, although when they finish their course it is said that they are perfectly qualified to do so.

When the enlisted men first enter the class they are confronted with a huge pile of old tires of every variety—cord, molded, wrapped, and so on. There are also innumerable tires for their inspection and study. After two or three lectures the men begin to tear apart the tubes and casings and learn what they are made of. Then comes the actual repair work.

An aged casing that has been skillfully repaired until it will again render service is subjected to terrible abuse until the average layman would pronounce it fit for nothing but the scrap pile. This casing is turned over to a couple of students and they are told to repair it so it can be used again. The results are often so remarkably well attained that they are amazing.

Sterling Tire Corp. Insures Workers

Following the example of many other companies, the Sterling Tire Corp., Rutherford, N. J., has arranged to give an insurance policy to every employe who had been with the company more than a year on May 1, 1918. The amount of insurance given a worker who had been with the company less than two years on that date was $600; two years, $700; three years, $800; four years, $900; five years or over, $1000. No medical examination is required and the expense of maintaining the policy is paid by the company, free of cost to the employe.

National Tire Opens Branch

The National Tire & Rubber Co., East Palestine, Ohio, has opened a branch store at Petersburg, Va.

British Rim Standards

The Pneumatic Tire Committee of the S. M. M. and T. (Society of Motor Manufacturers and Traders) recently gave consideration to a report received from America with regard to rim standards in the United States. According to *The India-Rubber Journal*, it appears that with two exceptions the proposal was to standardize straight-sided rims. The Committee resolved that only the American sizes for clincher type rims should be standardized in Great Britain.

With regard to motorcycle tires it was resolved to adopt the 28 x 3-in. American rim profile as standard for high-powered motorcycles, on the understanding that the Americans would adopt, for lower powers, the 26-in. rim, No. D2.

MacEachen in Service

H. G. MacEachen, formerly Western Division advertising manager for the Firestone Tire & Rubber Co. of Akron, Ohio, has entered the Veterinary Department of the United States Army.

Mr. MacEachen in the past had been a very successful veterinary surgeon, and upon learning that the army was in need of veterinary men, recently gave up his position at San Francisco and enlisted.

Mr. MacEachen has been with the Firestone company since the spring of 1916, when he was appointed assistant Western Division advertising manager. Late in 1916, when Manager C. B. Lindeman was called to Akron, Mr. MacEachen was promoted to the managership which he has held up to the present time.

Huge Hotel Garage for New York

Hotel men of New York are interested in the erection of a mammoth garage to care for the cars of hotel guests. A company has been incorporated under the name of Inter-State Garages, Inc., and it intends to have a garage in all of the principal cities of the country. The company has obtained a city block bounded by Forty-seventh and Forty-eighth Streets on Second Avenue, with a frontage of 250 ft. and extending 350 ft. on the side street. The company's plans are to provide an individual locked space for each car, the total capacity to be 863 cars. There will be no elevators, ramps being used to reach the five floors of the building.

Thrift Stamps Used to Pay Freight

Thrift stamps are being used to pay freight charges for goods delivered by drive-aways, under a new plan that is working satisfactorily in St. Louis and vicinity. C. A. Oldham, district manager of the United States Tire Co., in St. Louis, invented the scheme, by which dealers will carry their shipments of tires, tubes and accessories when driving their vehicles from factories or branches in St. Louis. The amount that the freight charges would have been by rail is then given to the dealers in thrift stamps.

Universal Tire Acquires Factory Site

The Universal Tire & Rubber Co., Houston, Tex., has purchased 30 acres on the ship canal in that city and plans to build a plant for the manufacture of automobile tires and tubes, according to information received from Houston.

Big Increase in Mason Sales

The sales of the Mason Tire and Rubber Co., Kent, Ohio, for June were $302,123.20. This is an increase of more than 100 per cent over June, 1917. The third quarter of the Mason fiscal year closes on July 31st, and promises to disclose a very interesting statement of net earnings, according to a statement issued by D. M. Mason, treasurer of the Company.

June net earnings of the Mason Tire & Rubber Co., Kent, Ohio, after setting aside reserve for depreciation, were $56,800. This is at the rate of eight times preferred dividend requirements for that period.

To Vote on Keystone Increase

Stockholders of the Keystone Tire & Rubber Co., New York, will vote at a special meeting to be held on August 1 on a proposal to increase the company's capital stock from $1,500,000 to $2,000,000.

Portage Dividends

The Board of Directors of The Portage Rubber Company, Barberton, Ohio, met at the office of the company in that city on July 12, and ordered paid the regular quarterly 3 per cent dividend on its Common Stock on August 15, 1918, on all stock of record August 5, 1918.

The Directors also ordered paid the regular quarterly 1¾ per cent dividend on its Preferred Stock on Oct. 1, 1918, on all stock of record Sept. 20, 1918.

Sandusky Rubber Constructing Plant

The Sandusky Rubber & Tire Co., Sandusky, Ohio, is reported to have started the construction of its plant in the east end of that city. The work is in charge of E. Hutchins, chief engineer.

Goodrich Improving Portland Branch

The B. F. Goodrich Co., Akron, Ohio, has awarded the contract for the construction of a one-story addition to its branch at North Broadway, Portland, Ore.

Bottenfield Tire to Build

The Bottenfield Tire Co., Liberty Street, Lancaster, Pa., plans to build a new addition to its plant, according to an announcement from that city. The addition is to cost $20,000.

Richmond Branch of U. S. Moves

The Richmond (Va.) branch of the U. S. Tire Co. has moved into new quarters which contain double the floor space formerly occupied.

Gillette Opens Philadelphia Branch

The Gillette Rubber Company, Eau Claire, Wis., has opened a Philadelphia branch at 677 North Broad Street.

The Philadelphia branch has been opened for the purpose of extending the field of distribution, and an effort will be made to obtain dealers throughout eastern Pennsylvania, southern New Jersey, Delaware, Maryland and Virginia.

Triple Airless Awards Contract

The Triple Airless Tire Co., 616-17 Jenkins Arcade, Pittsburg, Pa., has awarded the contract for the construction in Manorville, Pa., of a one-story, 120 x 135 ft., factory and power building. According to the report, this construction work will cost $85,000. A. C. Hileman is vice-president of the Triple Airless Tire Co.

Goodyear Discontinues Brooklyn Branch

The Goodyear Tire & Rubber Co. branch at 1172 Bedford Avenue, Brooklyn, N. Y., will be discontinued after May 15 and the business will be handled from the New York branch at 10 Central Park West and the Long Island City branch.

News Items from Tire Circles

East Peoria, Ill., Aids in Financing Tire Plant—Mount Vernon-Woodberry Mills, Inc., Awards Contract for Cotton Duck Factory—Plans for Automotive and Accessories Exposition in Chicago Progressing

Peoria to Have Tire Factory

East Peoria, Ill., through its commercial club, has furnished the land and aided in financing a factory that when built will add to the list of that city's products a trouble-proof tire for automobiles. Under the phonetic style Trubipruf this tire is one of the proposed lines that will be made by the owner of its patents, the Lambert Multiplus Company, at present located in its inventor's home city, Portland, Ore. Trubipruf tires are distinguished by a form of construction which allows them to ride on air at atmospheric pressure.

Mount Vernon-Woodberry Award Contract

The Mount Vernon-Woodberry Mills, Inc., manufacturer of tire ducks, of whom the sales agents is the firm of Turner, Halsey & Co., New York, has awarded the contract for the erection of a 2 and 4-story, 31 x 32 and 12 x 25-ft., cotton duck factory, to cost $25,000. The headquarters of the Mount Vernon-Woodberry Mills are at 506 Continental Building, Baltimore, Md.

J. M. Nichols Enlists in Navy

J. M. Nichols of the Nichols-Cox, Woodall Sales Co.' Brunswick tire distributor in St. Louis, has enlisted in the Navy after disposing of his interest in the firm to his partners.

Rural Motor Express Lines

Full use of motor trucks operating on the highways and a great increase in the operation of rural motor express routes are the objects of a campaign of information and encouragement that has been started by the National Motor Truck Committee of the National Automobile Chamber of Commerce.

Patriotic desire to stimulate food production and develop practical means of getting it to the market is the motive of the committee which has organized for the purpose a special department under the direction of S. A. Miles, with headquarters in the offices of the N. A. C. C., at 7 East 42nd Street, New York.

An investigation of existing rural motor express lines made by the Highways Transport Committee of the Council of National Defence has produced conclusive evidence that they are of great utility to farmers and rural merchants, that they encourage increased production of food by assuring quick and regular daily means of shipping to market, and that there are possibilities throughout the country for the establishment of many more similar lines with assurance of success.

As a result of this investigation the automobile industry has tendered its enthusiastic support to the movement as a patriotic duty. Manufacturers and dealers will at once be asked by the National Motor Truck Committee to cooperate by searching in their respective localities for routes over which motor express lines may be started and along which the rural population seems to justify expectation of profitable operation. They will also be requested to induce men to place trucks in such service to assist prospective operators in the selection of routes and with advice as to details of operation and management of business. Mr. Miles's department will supply information along these lines to be disseminated by the dealers.

Automotive Show

The recent meeting of the Automotive & Accessories Exposition, Inc., in Chicago, was one of a series held by those who are working for the proposed show's success and attracted a number of men from various parts of the country interested in the various uses of the gasoline engine.

A definite program was given, setting aside Saturday and Sunday, July 14 and 15, as days for hardware men, Wednesday especially for the farmers of Illinois, Indiana, Iowa and Ohio.

Trade Publications Review

The remarkable progress made in the retailing of automobile tires and tire accessories is well typified in an interesting handbook on the subject recently published by the McGraw Tire & Rubber Co., East Palestine, Ohio, entitled "Reaching Your Market."

This booklet deals with the fundamentals of success in selling tires to the user, and the story is so simply told that a dealer can quickly pick out the suggestions most applicable to his own business.

The pages devoted to advertising and selling are profusely illustrated with color designs, posters, cards, signs, booklets, ads, movie slides, etc., all worked out ready for use.

The pages devoted to service—the kind of service a dealer can render gratis to build up good will, also contain many helpful suggestions.

This readable little book, which can be obtained free of charge by writing to its publishers, will prove useful to large dealers as well as to the smallest repair man.

Pneumatic Truck Tire Mileage

Just now there is a great deal of interest in the operation of trucks on pneumatic tires and many business men are wondering whether pneumatics are adaptable to their particular business needs. H. P. Brown, a lumberman, of Tacoma, Wash., states in a letter to The Goodyear Tire & Rubber Co., Akron, Ohio: "Our two-ton truck, which makes the run daily to and from our logging camps, is equipped with your cord tires. Sixty miles of the run is over good roads, but thirty miles is over roads so rough that the truck was constantly in the repair shop during the period it was equipped with solid tires. We have gotten as high as 14,000 miles on front casings and 10,000 miles on rear casings, which, considering road conditions and the heavy loads carried, is very satisfactory, but we are particularly pleased with the reduction in repair bills that the change from solids to pneumatics has brought about."

Gasoline from Lignite

After amending it by increasing the appropriation from $100,000 to $150,000, the Senate on July 6 passed Senate Bill 3220 authorizing the Secretary of the Interior through the Bureau of Mines to make investigations to determine the practicability among other things of producing gasoline from lignite coals.

Mohawk in War Activities

The Mohawk Rubber Co.'s factory did its share in the recent Akron, Ohio, War Chest campaign. Every employee contributed. The average Mohawk pledge was $25.80.

War Chest placards posted in the Mohawk factory read: "Mohawk quality—One hundred per cent." With this as their slogan, Mohawk went over the top with colors flying. In the Third Liberty Loan drive, the Mohawk also distinguished itself. Every man subscribed.

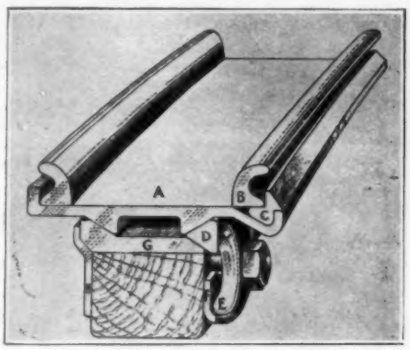
ATTRACTIVE W. S. S. WINDOW AT UNITED STATES RUBBER CO. BUILDING IN NEW YORK

Some New Tire Accessories

Firestone Perfects New Demountable Rim for Motor Trucks—Goodyear Brings Out a Patch for Cord Tires—An Efficient Rack for Repair Gum and Fabric—Special Valve for Pneumatic Truck Tires

Firestone Demountable Rim for Trucks

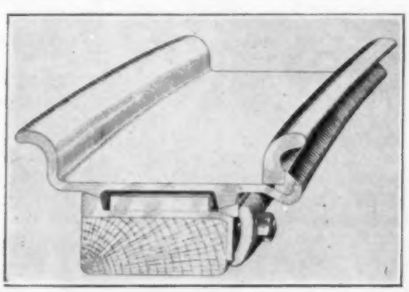
The Firestone Tire & Rubber Co., Akron, Ohio, the first in America to come to the front with a demountable rim for passenger automobiles in 1907, again in 1918 was first to perfect the rim that makes it practical for trucks to travel long distances at high speed on pneumatic tires.



ORIGINAL FIRESTONE DEMOUNTABLE RIM

A—Continuous One-Piece Base; B—Continuous Reversible Side Ring; C—Split Locking Ring; D—Split Wedge Ring; E—Clamp; F—Support for Clamp; G—Reinforcing Ring for Felloe Band.

One of the big reasons for the success of the "Giant" pneumatic tire in truck service is the fact that should a mishap occur to the tire while on the road, it can quickly be changed if mounted on a Firestone rim. The quick change ability of these tires is perhaps a more vital consideration in truck tire service than in passenger car service, because, while a passenger car may be run a short distance after deflation without apparent injury, a large truck tire under load cannot be run at all without suffering great damage.



NEW TYPE C FIRESTONE RIM

The structural principle of this new rim is the same as that of all Firestone demountable rims for pneumatic tires and consists of a "wedged-on" continuous surface contact between rim and felloe by a split wedge ring in such manner that the rim can never be sprung out of a true circumferential or lateral alignment. Thus the tire is assured uniform support and uniform wear throughout its circumference, and full tire mileage is assured as far as the rim is concerned.

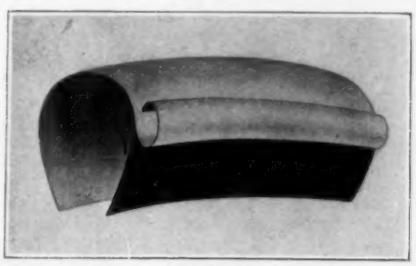
The type of rim made to carry these "Giant" pneumatic tires measuring 6, 7 and 8 in. in diameter is the well-known "Type C" Firestone Demountable Rim. This rim has been made for passenger cars for the last ten years, and for the last three years over a million rims of this type have been placed on the highest grade American cars.

GIANT PNEUMATIC ON NEW RIM

Goodyear Cord Patch

A big stride in the development of repair methods, as applied to cord tires, is found in the new cord patch announced by the Goodyear Tire & Rubber Co., Akron, Ohio. It is one of the simplest as well as the most satisfactory means of repairing cord tires, in case of inside breaks of all kinds, and injuries received from stone bruises. It can be used to reinforce, permanently, any weak spot in a tire, resulting from any kind of injury. Properly used it should add many miles to injured and partly worn-out cord casings and enable the owner to obtain the tire's full quota of service.

The new Goodyear patch is built of several layers of cord fabric—the same as used in the construction of Goodyear cord tires. Its construction is similar to that of the tire itself, with a heavy friction of gum between each layer of cords. The edges are tapered to prevent tube chafing. Its application to the inside of the tire is similar to that of a regular patch, and is so simple that any one may make the repair for himself.



GOODYEAR CORD TIRE PATCH

These tire patches are made to fit all sizes of cord tires. No. 1 is for use in 3-in., 3½-in. and 4-in. tires; No. 2 in 4½-in. and 5-in. tires, and No. 3 in 6-in., 7-in. and 8-in. tires.

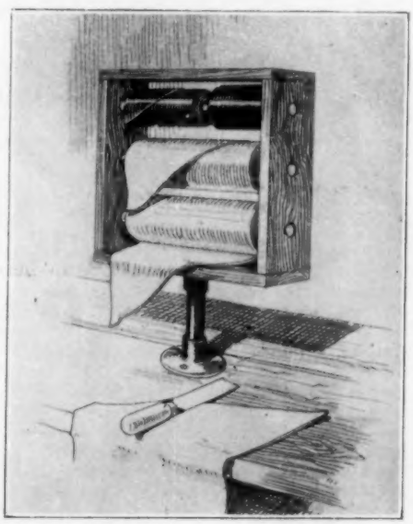
Schader Pneumatic Truck Tire Gauge

The wheels of motor trucks and fire apparatus equipped with giant pneumatic tires generally leave little space between the hub and the rim for the insertion of a tire pressure gauge of the standard type. To overcome this difficulty, A. Schrader's Son, Inc., 783 Atlantic Ave., Brooklyn, N. Y., the well-known tire valve manufacturers, have brought out a new universal tire pressure gauge, known as Style 3, which is made with a bent or angle foot and in addition to this, is calibrated to register air pressure up to 170 pounds, whereas the ordinary gauge cannot register beyond 120 pounds. The new gauge is also furnished with a special indicating sleeve calibrated in both pounds and kilograms.

An Efficient Gum and Fabric Rack

Here is a gum and fabric rack which tire repairers are finding convenient and practicable. It keeps the repair stock clean and permits several men to work at the same table without interfering with each other. It is a wooden frame, made to hold several rolls of gum and fabric, revolving on a stand fastened to the table. It can be turned in any direction to accommodate workmen at the opposite ends of the table.

The frame is two by four lumber, with holes bored through the sides to hold the rolls. The rack revolves on a piece of half-inch pipe, threaded on one end to fit a wide collar, which is screwed to the center of the table. On the bottom of the rack is screwed a piece of two-inch flat iron, into which a hole a trifle larger than the pipe support, is bored. This hole extends into the wood an inch to act as a recess for the pipe support, and increases its rigidity. Then another collar is screwed to the iron to hold the pipe in place.



A HANDY GUM AND FABRIC RACK

On the end uprights of the rack may be hung knives, rollers, stichers, scissors, etc., thus keeping the table clear of working tools and allowing more table space for the repair. The entire contrivance is so simple that any tire repair man can construct one very easily. This type of rack is used in the Goodyear School of Tire Repairing, Akron, Ohio.

MARKETS

Manufactured Rubber Goods

NEW YORK, July 19, 1918.

Trade conditions, generally speaking, are good, but the easing off in distribution coincident with the mid-summer and vacation season is being felt this year as usual. Prices are being well maintained with a decided upward tendency in many lines. There continues to be a scarcity in some articles, due partly to the heavy demand of Government needs, partly to the discontinuance of the manufacture of many lines of articles not considered essentials.

Buyers are not refraining from making purchase because of high prices, as a rule they are only too glad to get merchandise. Shipping conditions show some improvements and there are fewer embargoes than for some time past.

The sale of seasonable goods is about over and a dull period will probably continue until Fall.

Crops in the West promised to be the largest ever harvested, wages to farm hands are higher than ever before in the history of the country and a peculiar feature of conditions is that many laborers refuse to live on the farms and live in the nearest towns, which often means that the farmer must transport the people back and forth in automobiles.

The general movement to stop making articles for which there is not a steady demand or which are not essential continues. Collections show an increase over those for the corresponding fortnight a year ago. Cash sales are said to be very satisfactory.

MECHANICAL GOODS

The showing made to date by the rubber mechanical goods business, in spite of war conditions, can be described as nothing less than remarkable. Unprecedented activity in manufacturing circles continues, and jobbers report that the distribution of mechanical goods is far ahead of last year, measured in dollars.

Jobbers' stocks are in many instances running very low and several express the opinion that they will have to close their businesses for a few weeks soon because of their inability to secure fresh stocks of merchandise and because stocks on hand are so badly broken that it is practically impossible to make full shipments to customers.

The retail trade is becoming more and more concerned as regards supplies, and they no doubt have good reasons to feel as they do.

TIRES

There have been further increases in tire prices. Among the companies that have advanced their tire price lists, are the Lee Tire & Rubber Co., Conshohocken, Pa., 5 per cent; the Endurance Tire & Rubber Co., New Brunswick, N. J., 10 per cent; the McGraw Tire & Rubber Co., East Palestine, Ohio. This latter company quotes advance prices on tire and tubes, including the following brands: McGraw, Pullman, Congress and Imperial, with the following prices on the leading sizes: 30 x 3, $15; 30 x 3½, $18.70; 34 x 4, $32.65. Tubes, red, 30 x 3, $3.75; 30 x 3½, $4.60; 34 x 4, $6.70.

The Lee Tire & Rubber Co. and the Endurance Tire & Rubber Co. have increased prices of their tires beginning July 1. The Lee prices were increased 5 per cent and the Endurance 10 per cent. The following tables show the increases:

LEE TIRE & RUBBER CO.

CONSHOHOCKEN, PA.

Size	Old Price	New Price
30 x 3	$15.70	$16.50
30 x 3½	20.00	21.00
32 x 3½	23.50	24.70
31 x 4	31.00	32.55
33 x 4	33.05	34.70
34 x 4	34.25	36.00
34 x 4½	45.55	47.85
36 x 4½	48.40	50.85
35 x 5	55.90	58.70
37 x 5	59.15	62.10

ENDURANCE TIRE & RUBBER CO.

NEW BRUNSWICK, N. J.

30 x 3	$20.35	$22.40
30 x 3½	26.15	28.75
32 x 3½	30.25	33.25
31 x 4	39.90	43.90
33 x 4	42.65	46.90
34 x 4	44.00	48.40
34 x 4½	58.30	64.10
36 x 4½	61.90	68.10
35 x 5	69.85	76.85
37 x 5	74.00	81.40

The demand for tires is very heavy, but still dealers are able to get good shipments on about all sizes of most all brands. However, there is a scarcity in some of the higher priced brands of tires. The decision of tire manufacturers to follow the recommendations of the War Industries Board and reduce the number of types and sizes of automobile pneumatic tires and tubes from 287 to 32 sizes, and to continue this process of elimination until all but nine types and sizes will be left is causing no trouble in the trade because the plan is well designed and gradual. The general feeling is that the demand will be adjusted easily to meet the new conditions.

The following classification of pressed-on solid tires was tentatively adopted at a recent meeting of the War Service Committee, Division of Solid Tires held in Akron, Ohio:

Class "A" Permanent Stardard	Class "C" To be discontinued Nov. 1919	Class "D" To be discontinued Nov. 1918	Class "E" To be discontinued at once
32 x 3½	32 x 2½	42 x 5	34 x 7
34 x 3½	32 x 3	34 x 6	34 x 8
34 x 4	34 x 3	42 x 6	40 x 8
36 x 4	36 x 3	42 x 7	34 x 10
34 x 5	36 x 3½		42 x 10
36 x 5	32 x 4		36 x 12
40 x 5	38 x 4		42 x 14
36 x 6	40 x 4		
40 x 6	38 x 5		
36 x 7	38 x 6		
36 x 8	38 x 7		
36 x 10	40 x 7		
40 x 10			
40 x 12			
40 x 14			

While this classification has not been finally adopted, it is very probable that it will be at a later meeting.

DRUGGISTS' SUNDRIES

Jobbing houses are finding it harder and harder to secure rubber sundries, and there is a constant increase in the number of items in which there is a shortage, or in which the supply is entirely exhausted. So far, the retail trade has been able to fill its needs fairly well by shopping around among the different jobbing houses, and by often substituting other goods or other sizes. Shortage of labor, big Government demands and scarcity of materials are given as reasons for this state of affairs.

The retail trade is viewing the situation with considerable concern, and many retailers are now endeavoring to cover their requirements for next Spring. These retailers feel it is a good business policy to provide for future contingencies now by placing goods in stock and paying for them in order to have them when wanted.

Cotton Yarn and Fabric

NEW YORK, July 19, 1918.

The end of the month of July sees the raw cotton market in a somewhat chaotic state. The cutting off of exports has necessitated the carrying over of 3,000,000 bales of the old crop, and this surplus will be increased when the new crop comes on the market. In addition to this, action tending towards the establishment of maximum prices is daily expected from Washington. The tone of the market, however, is strong, and at the time of writing the market is advancing sharply on the favorable news from France. On the news of the splendid American victory the market was bid up 40 to 50 per cent by the bulls on the local Exchange. The drouth in the Southwest is continuing and is reported to be having a serious effect on the growing crop. The boll weevil pest is reported very destructive this year, and the Texas crop is deteriorating.

However, trade buying has been resumed on a somewhat freer scale, and there is still some buying being done for export by Japanese and British interests. The bulk of the business being placed at present is for cotton to be delivered in October and November, and the premium on spot cotton over future cotton is very large at present. Prices now are within 2 cents of the high levels for 1918.

SEA ISLAND COTTON

Trading in this staple is quiet at present, with offerings small and the market firm. The growing crop is reported to be in poor condition due to unfavorable weather and the activity of the boll weevil pest; and the yield is not expected to be large. Values are still unchanged, with the average extra choice quoted at 70 to 75 cents per pound.

EGYPTIAN COTTON

The market continues quiet with trading confined to small lots. Supplies are very low, and no late arrivals of cargoes have been reported from Boston. There remains a balance of only 20,000 tons to

be imported during the year, and it will be somewhat of a problem to get this stock here in view of the shortage of tonnage.

FABRICS

The market at present is at a standstill, with the exception of Government work, and the trade is awaiting the establishment of official prices covering all specifications of cotton fabrics. Prices for two specifications of print cloths have already been fixed and prices for all specifications of cotton fabrics are expected to be announced daily. Conferences between Government officials and leaders in the trade are being held in New York City now to determine the basis upon which to establish the prices.

TIRE FABRICS

Values for tire fabrics remain unchanged, with a strong demand reported. Dealers are awaiting the establishment of prices governing Sea Island and Egyptian combed and carded cotton, and in the meantime the market holds firm.

HOSE AND BELTING FABRICS

This market will be affected by the action of the Government in establishing prices on ducks, and while the price-fixing will not make it any easier for rubber manufacturers to get their supplies, prices fixed by the Government are below those prevailing the market at the time the action was taken. The prices fixed so far are as follows: Standard width and sail ducks, 37½ per cent and 5 per cent from present list prices. Standard army duck, 33 per cent from list. No mention of the general line of ducks was made in the announcement, and as a result of this, the trade is somewhat in a quandary, and prefers to go slow with new business pending definite information.

DRILLS, SHEETINGS, AND OSNABURGS

This market is also affected by the Federal price-fixing, and the trade at present is awaiting some definite news regarding the prices. Prices already established are 60 cents per pound for 36 inch 48 x 48 3.00 yard sheeting, and 70 cents per pound for 36 inch 56 x 60 4.00 yard sheeting. No other prices have yet been announced, but some further action is expected at any time now. The Government is still taking enormous quantities of these fabrics from the market.

YARNS

The cotton yarn market is dull at the time of writing, and trading is virtually suspended while the trade is awaiting some action by the price-fixing committee of the War Industries Board. Spinners are not making any offers, and consumers are inquiring for just enough stock to complete orders on which they are working. Pending the price fixing, conditions remained unchanged with supplies low, and embargoes delaying what shipments that are made.

BURLAPS

A fair demand for burlaps has continued during the past two weeks, and the market is showing a firmer tone. Prices are advancing and conditions have reached such a point that some dealers are reported to be planning protests to the Government. It is thought that joint action by the British and American Governments to fix prices would go a long way towards stabilizing the market.

New York Quotations

TIRE FABRICS

17¼-ounce Sea Island, combed,	sq. yd.	$1.70@	—
17¼-ounce Egyptian, combed...		1.40@	—
17¼-ounce Egyptian, carded...		1.30@	—
17¼-ounce Peelers, carded.....		1.10@	—
17¼-ounce Peelers, combed.....		1.15@	—

DUCKS

Single Filling (pound basis).....	lb.	.78	
Double Filling (pound basis).....		.79	

DRILLS

37-inch 2.35-yard	yd.	.35	
37-inch 2.75-yard		.30	
37-inch 3.00-yard		.29	
37-inch 3.25-yard		.27	
37-inch 3.50-yard		.26	
37-inch 3.95-yard		.22½	
37-inch 2.00-yard Southern.....	lb.	.75	
38-inch 2.00-yard Northern.....		—	
40-inch 2.47-yard Northern.....	yd.	.35	
40-inch 2.47-yard Northern.....		—	
52-inch 1.90-yard Southern.....		.40	
52-inch 1.90-yard Northern.....		.40	

SHEETINGS

40-inch 2.35-yard	yd.	.38
40-inch 2.50-yard		.39
40-inch 2.85-yard		.33
40-inch 3.00-yard		.32
40-inch 3.25-yard		.30
40-inch 3.75-yard		.25
40-inch 3.60-yard		.28
40-inch 4.25-yard		.22
38-inch Jacket Cloths.....	yd.	.21@23

BURLAPS

(Spot Carload Lots)

40-inch 8 -ounce		19.00
40-inch 10 -ounce		23.50@23.75
40-inch 10½-ounce		24.00@24.25

Chemicals and Compounding Materials

NEW YORK, July 19, 1918.

With a few exceptions the market for chemicals and compounding materials has displayed no great changes during the past two weeks, and as most manufacturers had anticipated their future requirements, incoming demand was wholly of a routine character. Virtually all acids continue to be hard to locate and the previously noted nominal prices continue without change in most cases. The Government has established fixed prices for sulphuric and nitric acid and has taken over control of the domestic production and distribution of sulphur materials.

In the oils, linseed oil furnished the outstanding feature and the market is in an unsettled condition. While linseed oil has been on a strong basis for some time owing to the small amount of oil held by crushers, the situation became stronger when it was announced that the Government had revoked all licenses for shipment of foreign seed to this country. A sharp advance was noted, and linseed oil is quoted at present at $1.82 per gallon, which is 20c. higher than the price two weeks ago.

ANTIMONY SULPHURETS

There is a steady to firm undertone in this market with offers less freely made owing to the fact that stocks are not too plentiful, while a fair volume of routine business is passing. No change has been made in prevailing prices however and prompt business is quoted at 25 and 26c. per pound for the sulphuret red and 28 and 30c. for the golden. Crimson holds at 45 to 47c. per pound.

ANILINE OIL

Pressure from secondhands has been well eliminated in aniline oil and the market shows continued firmness with spot lots quoted at 27½ to 29c. per pound. Only small stocks are reported available and all offers are rather tightly held.

BENZOL

Liberal stocks are still available in this market with producers offering prompt shipments on the basis of 25 to 28c. per gallon for the pure, water white grade, in tanks. The undertone of the market is barely steady.

BARYTES

There will be no change in the prices until next Fall but a sharp advance is predicted, when the new prices will be fixed under the constantly increasing cost of production.

CAUSTIC SODA

Comparatively little variation in prices was shown in caustic soda and business as a rule has been booked at 4c. per pound for 76 per cent solid, although in some second-hand quarters as low as 3.90c. is said to have been accepted.

DRY COLORS

July is generally the dullest month in the dry color line and has been so during the current year with the exception of the blues for which a good demand has developed under sales of Prussian blue as high as $1.60 per pound.

LEAD PIGMENTS

The basic lead market is held in check by an agreement of all the producers to hold the basis of 7.75c. a pound East St. Louis and 8.05c. New York. This action has produced a steady tendency in the white lead basic carbonate which is quoted unchanged at 9½ @ 10½c. per pound, while the basic sulphate is held at 9½c. per pound. For red lead dry the Government is a heavy consumer and it is somewhat difficult to fill all the demands of the trade promptly.

LITHOPONE

Good orders have been placed up to September at the fixed price of 7½ @ 7¾c. per pound as it is considered almost certain that the price for the next quarter will not be as low as the present ruling price.

OILS

Linseed oil has been the feature of the oil market during the past two weeks, and the placing of flax seed on the list of restricted imports has caused a sharp advance of 20c. a gallon and the present price of $1.82 per gallon is now firmly held. Some of the larger producers have withdrawn from the market entirely for the time being as they do not care to book orders which they may not be able to fill.

SULPHUR

The War Industries Board has passed a resolution approved by the President, taking over control of the production and distribution of sulphur materials. This was made necessary by the increased demand from the Government for sulphur in the manufacture of explosives and for other purposes and by the increasing burdens on the rail and water systems in the transportation of materials.

TURPENTINE AND ROSIN

While Southern markets continued bullish on the future outlook a recession took place in the New York market. Turpentine closed 2c. a gallon lower and common to good rosin eased off 20c. a barrel. Consumers believe that the advance is over and are holding off in the hope of a further reaction, but producers contend that the decrease in production has been so great that the advance is fully justified.

Prices Current for Chemicals, Fillers, Colors, etc.

Acetone	lb.	*.25½	@	.25¾
Accelerator, in drums....	lb.	.85	@	1.00
Acids, Acetic, 56%.....	lb.	.14	@	.18
Carbolic, C. P....	lb.	.44	@	.48
Cresylic, 95%...gal.		1.10	@	1.20
Muriatic, 20 deg..lb.		.02¼	@	.02½
Muriatic, 22 deg.lb.		.02¾	@	.03
Nitric, 42 deg....lb.		.09¼	@	.09½

Nitric, 40 deg.	lb.	.09	@ .09¼
Sulphuric, 60 deg.	ton	18.00	@ 20.00
Tartaric, crystals	lb.	.93	@ .95
Aluminum Flake	**ton**	**28.00**	**@ 30.00**
Aniline oil, bulk basis	lb.	.27½	@ .29
Antimony, metal spot	lb.	13.12½	@ 13.37½
Oxide	lb.	15.00	@ 16.00
Sulphuret, red	lb.	.25	@ .26
Sulphuret, golden	lb.	.28	@ .30
Sulphuret, crimson	lb.	.45	@ .47
Asbestos	**ton**	**35.00**	**@ 45.00**
Asphaltum, Egyptian	lb.	.20	@ .25
Domestic	ton	22.00	@ 30.00
Barium sulphate, technical	lb.	.04½	@ .05
Sulphide	lb.	07¼	@ .07½
Barytes, prime white imported	ton	*40.00	@ 45.00
white, domestic	ton	32.00	@ 36.00
off color domestic	ton	22.00	@ 24.00
Benzol, pure, bulk	gal.	.25	@ .28
Beta-naphthol, sublimed	lb.	.85	@ .90
unsublimed	lb.	.65	@ .75
Blacks, Drop	lb.	.05½	@ .15
Ivory	lb.	.16	@ .30
Carbon, gas, cases	lb.	.16	@ .25
Lampblack, R. M.	lb.	.15	@ .45
Mineral blacks	ton	35.00	@ 45.00
Blues, Prussian	lb.	1.50	@ 1.60
Soluble	lb.	1.60	@ 1.75
Ultramarine	lb.	.17	@ .50
Browns, Umber, Turkey, burnt, powdered	lb.	.05	@ .07
American, burnt	lb.	.03½	@ .04
Cadmium sulphide, yellow	**lb.**	**2.00**	**@ 2.25**
Carbon, bisulphide, bulk	lb.	.08½	@ .09
tetrachloride, drums	lb.	.15½	@ .17
Caustic Soda, 76@78%	lb.	.04	@ .04⅛
Chalk, precipitated, extra light	lb.	.05	@ .05¾
light	lb.	.04¾	@ .05¼
heavy	lb.	.03¾	@ .04¼
China clay, domestic	ton	15.00	@ 22.50
imported	ton	*20.00	@ 36.00
Fossil flour	**lb.**	**.03¾**	**@ .05**
Gilsonite	ton	50.00	@ 55.00
Glue, extra white	lb	.36	@ .45
medium	lb.	.31	@ .35
low grade		.24	@ .27
Glycerine, C. P. (drums)	lb.	.64	@ .64½
Graphite, flake (bbl.)	**lb.**	**.18**	**@ .20**
powdered (bbl.)	**lb.**	**.13**	**@ .15**
Green, chrome, R. M.	lb.	.14	@ .20
Ground glass (fine)	lb.	.03½	@ .04
Hexamethylene	lb.	1.10	@ 1.15
Infusorial earth, powd'd.	**ton**	**60.00**	**@ —**
bolted	**ton**	**70.00**	**@ —**
Iron oxide, red, reduced grades	lb.	.07	@ .08
red, pure, bright	lb.	.15	@ .20
Lead, red, dry	lb.	.10¾	@ .11¼
sublimed blue	lb.	.09	@ .09½
white, basic carb.	lb.	.09½	@ .10½
white, basic sulp.	lb.	.09	@ .09½
Lime flour	lb.	.01¾	@ .02
Litharge	lb.	.10¼	@ .10¾
English	**lb.**	***.12**	**@ .13**
sublimed	**lb.**	**.09¼**	**@ .09¾**
Lithopone, domestic	lb.	.07½	@ .08½
Magnesia, carbonate	lb.	.12½	@ .13½
calcined, heavy	lb.	.11	@ .12
calcined light	lb.	.75	@ .80
Magnesite, calcined, pwd.	ton	50.00	@ 65.00
Mica, powdered	lb.	.04¾	@ .05
Mineral rubber (asphaltum base)	**ton**	**80.00**	**@115.00**
Naphtha, motor gasoline, (steel bbls.)	**gal.**	**.24**	**@ —**
68 @ 70 degrees (steel bbls.)	**gal.**	**.30**	**@ —**
70 @ 72 degrees (steel bbls.)	**gal.**	**.31**	**@ —**
73 @ 76 degrees (steel bbls.)	**gal.**	**.33**	**@ —**
machine (wood bbls.)	gal.	.42	@ —
Oil corn, crude	cwt.	17.75	@ 18.00
corn, refined	cwt.	21.47	@ 21.67
linseed (bbl.)	gal.	1.82	@ 1.83
palm, Lagos	lb.	*.39	@ .40
pine, yellow	gal.	.49	@ .50
rapeseed, refined	gal.	1.80	@ 1.85
rapeseed, blown	gal.	*1.90	@ 2.00
rosin, first rectified	gal.	.00	@ ..
tar (commercial)	gal.	.34	@ .35
Orange mineral, American	lb.	.13¾	@ .15
imported	lb.	*.15	@ .20
Paraphenylenediamine	lb.	3.75	@ 4.00
Petrolatum, bbls., amber	lb.	.06	@ .07
pale yellow	lb.	.06	@ .07
Pine tar, kiln	bbl.	11.00	@ 11.50
Pitch	bbl.	6.50	@ —
Plaster of paris	bbl.	2.00	@ 2.50
Red, Tuscan	lb.	.32	@ .40
Indian (reduced)	lb.	.07	@ .09
Standard	lb.	.12	@ .16
Rosin (common to good) @ 280 lbs.	**bbl.**	**10.90**	**@ —**
Rotten stone, powdered	lb.	.02½	@ .04¼
Rubber, substitute, black	lb.	.13	@ .17
white	lb.	.15	@ .24
brown	lb.	.20	@ .25
Shellac, fine orange	lb.	.69	@ .71
T. N.	lb.	.65	@ .67
Bleached ordinary	lb.	.63	@ .64
Bleached bonedry	lb.	.74	@ .75
Silex (silica)	ton	22.00	@ 40.00
Soapstone, powdered	ton	15.00	@ 25.00
Starch, corn, powdered	lb.	4.05	@ 4.36
Sulphur, crude	**ton**	***50.00**	**@ ..**
refined, flour, per 100-pounds, in bbls.		**3.85**	**@ 4.40**
roll		**3.70**	**@ 4.15**
commercial		3.25	@ 3.75
Talc, American	ton	20.00	@ 40.00
French	ton	*30.00	@ 35.00
Toluol, pure, in drums	gal.	1.50	@ 1.55
Tripolite earth	**ton**	**60.00**	**@ 70.00**
Turpentine, pure gum—spirits	gal.	.72	@ .73
wood	gal.	.68	@ .70
Venice, artificial	**gal.**	**.12**	**@ .13**
Vermilion, English	lb.	2.00	@ 2.10
Wax, beeswax, crude, yel.	lb.	.41	@ .42
ceresin, white	lb.	.18	@ .25
carnauba, No. 3	lb.	.76	@ .80
Montan	lb.	*.35	@ .40
ozokerite, black	**lb.**	**.75**	**@ .80**
ozokerite, green	**lb.**	***.85**	**@ .95**
Paraffin, refined, 118/120 M. P. (bbls.)	lb.	.12¾	@ .13
Wax, Paraffin, 123/125 M. P.	lb.	.13	@ .13¼
128/130 M.P.	lb.	.14	@ .14½
133/136 M.P.	lb.	.15	@ .15½
Crude, 120/122 M.P.	lb.	.10	@ .10¼
124/126 M.P.	lb.	.10¼	@ .10½
Whiting, commercial	cft.	1.25	@ —
Alba	cwt.	1.25	@ —
Whiting, Paris, white, American	cwt.	1.50	@ 1.75
English cliffstone	cwt.	1.75	@ 2.75
Yellow chrome	lb.	.30	@ .35
Zinc oxide, States Brand		.10	@ —
horsehead brand	**lb.**	**†.10¼**	**@ .10½**
selected	**lb.**	**†.10¾**	**@ .11**
"XX red"	**lb.**	**†.10¼**	**@ .12**
French process, green seal	lb.	†.13½	@ .14¼
red seal	lb.	†.13	@ .14½
white seal	lb.	†.14	@ .14¾
Zinc substitutes	ton	35.00	@ 40.00
Zinc, sulphide, pure	lb.	.06	@ .07

*Nominal. †Contract prices.

Crude Rubber

NEW YORK, July 19, 1918.

The monotonous character of the market for crude rubber at the present state of development is easy to explain under the reigning system of restricted imports. There is hardly any activity displayed in the various descriptions of crude rubber, simply for the reason that all free rubber has gone into consuming channels, and the allocated tonnage for the first three months of restrictions has been all under contract. Even in the Central grades which do not fall under the restrictions, but for which maximum prices have been fixed by the War Industries Board, trading is without any features, as the use as well as the supplies of those grades are bound to limitations. As the first period of restricted trading is running off with August 1, expectations as to the future course of the rubber market are widely divergent. There are at present conferences held at Washington between the War Industries Board and the various committees of the importers, dealers and manufacturers, but a definite result has not been reached. If established precedents can be taken as a guide, the Government will urge the conservation of all crude rubber supplies, even if some of the non-essential industries had to suffer and had to curtail their activities. The essential point for the Government is to save ocean tonnage, and the authorities will go to the limit to attain this result.

According to the statistics there was enough crude rubber held here in stock and in transit, when the first restrictions were issued, to bridge the rubber consuming industries over a period of a year if the allocation of 100,000 tons per year were taken into consideration. As the situation has not greatly changed since then, it is hardly believed possible that a change will be made in the present rate of allocation. In regard to the maximum prices, there is a possibility that prices might be revised as the situation at primary centers has fundamentally changed and the Prime grades of Plantation rubber can be laid down at New York around 42 to 45c. a pound, which compares with the maximum price of 63c. ruling at present. Still it might be an injustice to consumers who secured large tonnages at those maximum prices, to establish a lower standard.

The situation at Singapore is so serious that it will probably call for action by the British Government. The short-sightedness of most of the planters at the Far East has much aggravated the disastrous conditions ruling at the Far East. When the first proposal was made by the Rubber Growers' Association that a curtailment in the output was necessary to safeguard prices, most of the planters were not inclined to consider the proposition. But now as the American restriction of imports has been in operation the accumulation of stocks has caused the collapse of prices in Singapore and is threatening the entire industry with ruin. Rubber is sold close to the producing point and it is heard that the British Government will step in and decree a reduction in output which will amount to about 50 per cent.

Prices quoted for delivery of allocated rubber are entirely nominal as no actual business is in sight, on firm bids it is believed quoted prices might be shaded.

	Spot.	July-Aug.	Oct.-Dec.
Para—Up-river fine	68	63	..
Up-river medium	63	57	..
Up-river coarse	40	36	..
Caucho ball	40	36	..
Islands fine	59	57	..
Islands coarse	27	26	..
Cameta	28	27	..
Madeira fine	69	..	..
Ceylons-smoked sheets, ribbed	62	62	44
Smoked sheets, plain	60	60	42
First latex pale crepe	63	63	46
Amber crepe	60	60	45
Clean brown crepe	58	58	40
Centrals—Corinto, prime	39	39	..
Esmeralda, prime	39	39	..
Mexican scrap	35	35	..
Balata sheets	97	..	..
Balata, block Panama	59	..	..
Guayule	35	35	..
Africans—Rio Nunez, string	55	..	..
Massai, red	55	..	..
East Indian Pontianak	15	..	..
Palembang	16	..	..

* Nominal.

Scrap Rubber

NEW YORK, July 19, 1918.

There have been no special developments in the scrap rubber market since our last report. The market is quiet, with prices more or less nominal.

The following prices were paid for scrap rubber delivered at the reclaiming mill:

Boots and shoes	6	@	6¼
Arctics, trimmed	6¼	@	6½
Arctics, untrimmed	5¼	@	5½
Tires—Automobile	5¼	@	5¾
Bicycles, pneumatic	5	@	5⅛
Mixed hose	2	@	2⅛
Air brake	5¾	@	6
Inner tubes, No. 1	21½	@	22¼
Inner tubes, No. 2	10½	@	11¼
Inner tubes, red	10½	@	11¼